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Massachusetts agriculture and food self-sufficiency : an analysis of change from 1974 through 1997.

David Lee Holm
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MASSACHUSETTS AGRICULTURE AND FOOD SELF-SUFFICIENCY: AN ANALYSIS OF CHANGE FROM 1974 THROUGH 1997

A Dissertation Presented

by

DAVID L. HOLM

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
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Department of Plant and Soil Sciences

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DEDICATION

To the farmers of Massachusetts,

for whose vital work I have utmost respect.

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ABSTRACT

MASSACHUSETTS AGRICULTURE AND FOOD SELF-SUFFICIENCY:

AN ANALYSIS OF CHANGE FROM 1974 THROUGH 1997

SEPTEMBER 2001

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Despite an agricultural legacy originating in Colonial times, Massachusetts experienced a serious decline in agriculture during the decades following the Second World War. An up-to-date report was needed to identify changes in the state of Massachusetts agriculture at the end of the twentieth century. Data for this analysis came from U.S. government statistical reports. The last six U.S. Census of Agriculture reports, from 1974 to 1997, were consistent in defining a farm as an operation with over $1,000 in sales, allowing data comparisons. Contrary to national trends, the number of farms in Massachusetts increased and average farm size decreased. Large nominal increases in farm product sales and net farm income were real increases with dollars adjusted by the Producer Price Index for farm products. The top agricultural products group was fruits, nuts, and berries; second was nursery and greenhouse. Dairy sales, the third highest group, remained stable, even though the number of dairy farms declined. Still a New England leader in apples, Massachusetts lost land in orchards and

farms with orchards. Massachusetts was a national leader in direct marketing, with highest direct market sales per farm. Debt-to-asset ratios and rates of return indicated strengthened financial positions relative to farmers nationwide. Trends posing concern included: continued loss of land on farms and cropland, older average age of farmers with fewer younger farmers, and escalating costs of farmland making new entry difficult. Food self-sufficiency, as measured by the difference between retail value of food production and value of consumption, increased from 13.7 percent in 1975 to 17.8 percent in 1997. Self-sufficiency decreased in livestock and livestock products, remained unchanged in seafood, and increased in fruits and vegetables. New England overall self-sufficiency remained at 28 percent. A case study illustrates a farmer's adaptation to new market conditions. Strategies included direct marketing through pick-your-own and roadside stand operations; value-added production through a farm bakery; agri-tourism enterprises; and reorganized employee and financial management. The farmer received financial and consulting assistance through the Agriculture Preservation Restriction and Farm Viability Enhancement Programs. Massachusetts successfully reversed earlier downward trends and deserves well-earned respect for revitalization of its agriculture.

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CHAPTER I

ASSESSING CHANGE IN AGRICULTURE AND FOOD PRODUCTION

Introduction

Throughout the 1900s, the Commonwealth of Massachusetts lost farmland and farmers (Foster, 1977), as did the United States as a whole (USDA, 1981; Schertz, 1979). Today, if one climbs to the summit of Mount Wachusett in central Massachusetts, you will see grown-over forest in every direction, but you will be looking at land that was cultivated farmland and pasture just a hundred years ago. Bordered by crumbling stone walls, the fields have been reclaimed by trees and undergrowth. Farmland abandoned by farmers, perhaps disillusioned after being challenged by the pressure of competition posed by western and southern farmers (Platt et al., 1975). The new manufacturing jobs promised a higher standard of living, luring many farmers away from the countryside into burgeoning towns and cities to work in textile mills and factories. Then, later in this past century, many would-be farmers were drawn away from the land by the promise of well-paying jobs in defense industries and later in computer research, development, and manufacturing. As Massachusetts became increasingly urbanized, farmers realized that their land was a more valuable source of revenue when sold to developers than when used for agricultural production. Subsequently, many farmers sold their land, often accepting offers far above

agricultural value (Dukakis et al., 1988). What is the status of agriculture in Massachusetts today? Has there been a reversal of the downsizing trend during the last decades of the twentieth century? Has the number of farms grown in Massachusetts? Who are the farmers today in contrast to farmers in the past and what products do they now sell compared to those they sold in the past? Have farmers been successful enough to keep farming instead of succumbing to the temptation of selling their land to developers? Have farmers taken off-farm jobs to supplement their farming income? Will a new generation of farmers replace the present generation of farmers when they retire? Has Massachusetts agriculture thrived or has it been dying out? To answer these timely questions, this study analyzes the dramatic and subtle changes that have been taking place in the structure of Massachusetts agriculture during recent decades.

The Census of Agriculture and an Explanation of Terms

A precise, standardized measure of the state of agriculture in the United States is provided by the Census of Agriculture. A Census report, now released every five years, serves as a blueprint of changes in agriculture across the United States. It provides the data by which researchers can gain insights into the agricultural patterns occurring in the country as a whole, in individual states, and in counties within each state. In contrast to selective sample data, Census data represent all farms. Census data are also accurate on a variety of

dimensions, such as crop type, geographic region, farm size, and the demographics of the farming population (USDA, 1999b, p.vii).

An agricultural Census has been conducted in the United States since 1850, when the definition of a farm used for the Census was any farm operation producing at least $100 worth of agricultural products for home use or sale. The Census has undergone nine changes based on amount of food produced, amount of food sold, amount of farmland per operation, and management of the operation (USDA, 1999b; Wimberly, 1996). Beginning with the 1974 Census, the definition has been "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the Census year" (USDA, 1999b). This consistency in the definition since 1974 allows for comparability of most data between Census reports of 1974, 1978, 1982, 1987, 1992, and 1997. Consequently, 1974 was selected to be the starting date for this dissertation's documentation of trends in the changing landscape of Massachusetts agriculture.

This dissertation uses the same terms as the Census with some minor variations. The terms "land on farms" and "farmland" are both used in this text as equivalent to the Census use of "land on farms" to mean all lands under the management of a farm operator, either owned or rented, including cropland, pastureland, woodland, other unproductive land on the farm unit, and land for farm buildings and roadways. Cropland includes all land suitable for harvesting

crops, including hayland, vineyards, orchards, nurseries, and greenhouses. Crops are categorized into the following Census product groups relevant to Massachusetts farmers: grains; tobacco; hay, silage, and field seeds; vegetables, sweet corn, and melons; fruits, nuts, and berries; nursery and greenhouse crops; and other crops. The term "livestock" is used in this dissertation as equivalent to the Census term "livestock and livestock products". Livestock is categorized into the following product groups: poultry and poultry products; dairy products; cattle and calves; hogs and pigs; sheep, lambs, and wool; other livestock and livestock products. The terms "agricultural sales" and "farm product sales" are used as equivalent to the Census term "market value of agricultural products sold" to mean the gross value, before deducting expenses or taxes, of all farm production sold or removed from farms. This dissertation uses the terms "direct marketing," "direct sales", and "direct-to-the-consumer sales" as equivalent to the Census term "value of agricultural products sold directly to individuals for human consumption". Direct sales includes sales from farmers' markets, pick-your-own sites, roadside stands etc., but excludes sales of non-edible products such as flowers, nursery crops, wool, etc and value-added products resulting from on-farm processing.

Nationwide Trends

The changes occurring in the United States agricultural system over the last century have been expertly described by Smith (1992a, b), an agricultural

economist at the University of Maine. Smith describes the last century as a period of rapid industrialization, during which the nation's agricultural system was split into three distinct economic sectors: the farming sector, consisting of farmers not only growing crops and livestock but also developing agricultural products; the input sector, consisting of producers and suppliers of farm inputs used by farmers such as fertilizers, chemicals, seeds, and equipment; and the marketing sector, consisting of food processors, distributors and retailers. The input and marketing sectors gradually expanded, becoming industrialized mass production and distribution systems with increased mechanization and specialization. In effect, the input and marketing sectors took over many farming activities that had previously been the realm of the farmer (Figure 1.1).

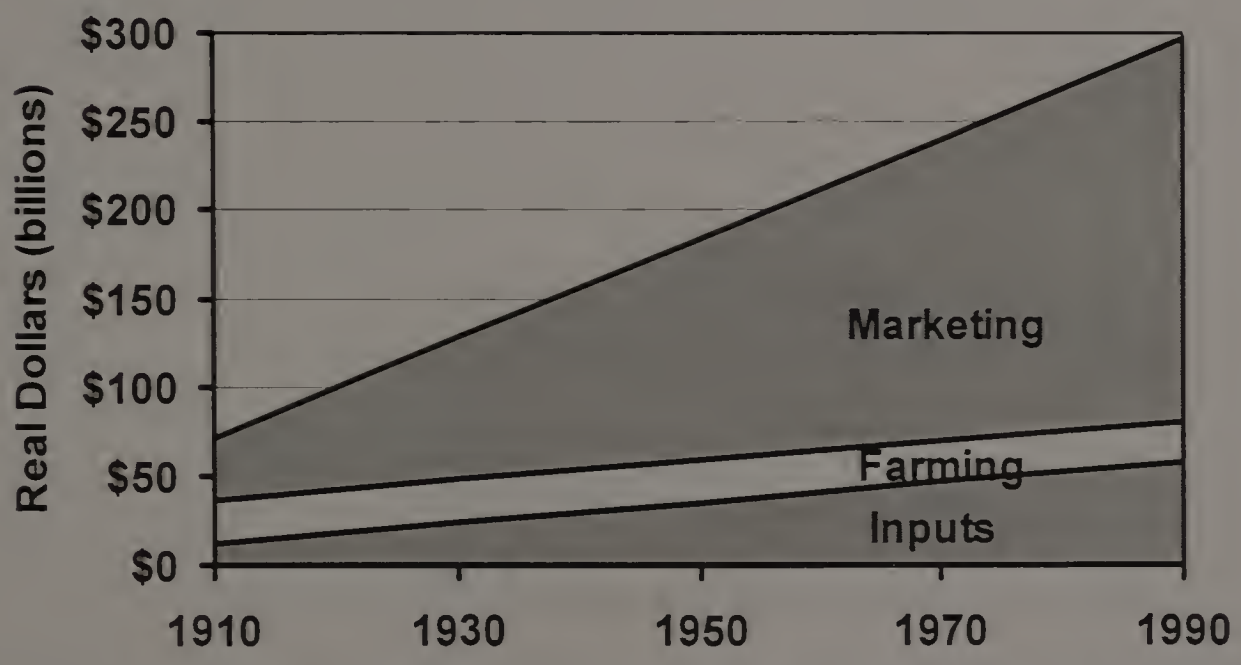

Figure 1.1. Agricultural inputs, farming, and marketing sectors of the U.S. agricultural system, 1910-1990, real dollars in billions represented as smoothed trend lines (Smith, 1992a).

The majority of farmers followed the industrial model of specialization and mass production, focusing their efforts on increasing output by using purchased inputs. These farmers no longer sold their own crops and livestock, but rather sold to processors and distributors and hired marketing agents to expand sales. The farmers, however, in sharing profits with input suppliers and marketers retained a smaller and smaller portion of the food dollar. In fact, the nation's farmers earned less in nominal terms in 1990 than they had in 1910. In 1990, they earned only 9 percent of the consumer's dollar after paying for production inputs versus the 41 percent that they had earned in 1910 (Figure 1.2).

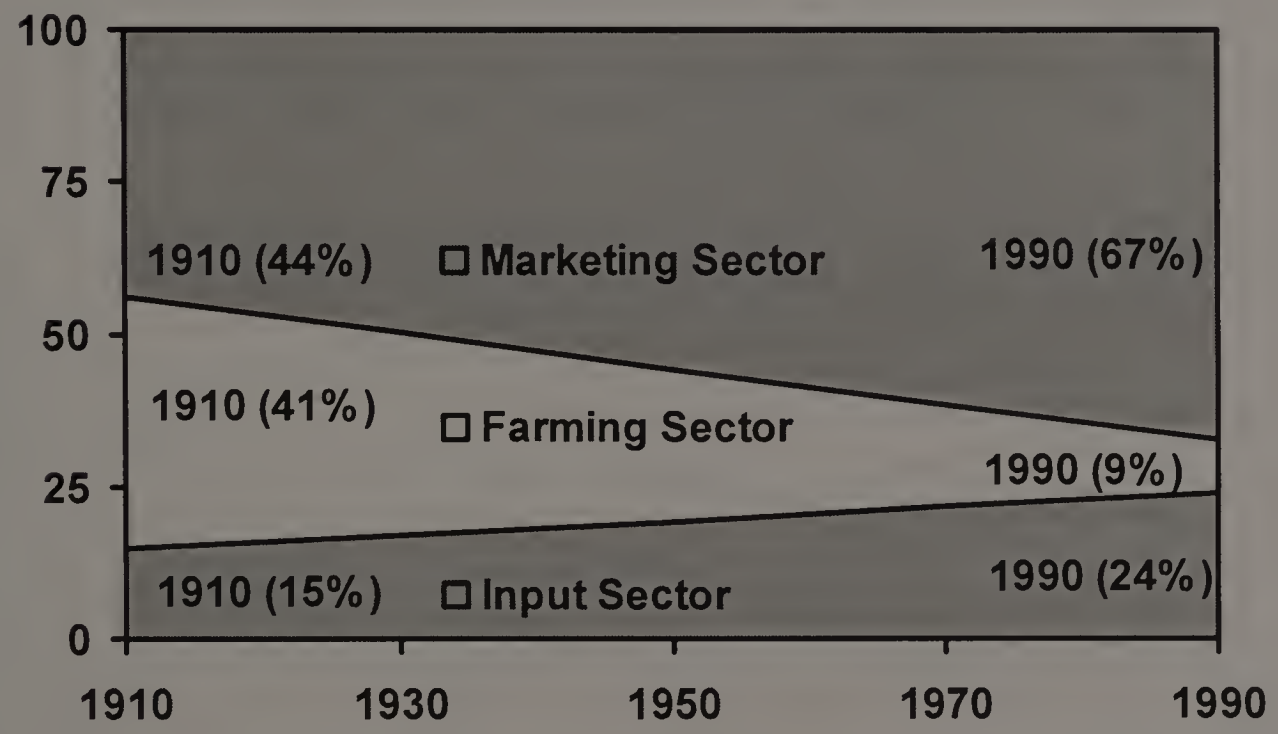

Figure 1.2. Input, farming, and marketing sector shares of U.S. consumer dollar, 1910-1990, with trend lines smoothed (Smith, 1992a).

The diminished economic profits to farmers in the 1990s caused many farmers to give up farming, whereas others made necessary changes to stay in farming. Farmers unable or unwilling to expand their farm operations left farming

to increase their incomes in other occupations. Those remaining in farming attempted to compensate for smaller returns by producing more, buying more farmland, raising more stock, and working larger and larger farms with bigger equipment. There was a spinning-off of farming activities, with respective profits to the industrialized farm input and marketing sectors of the economy.

According to Smith, the old-time generalist farmer who was in large part self-sufficient gave way to a new farmer who was then dependent on the assistance of modern mass marketing specialists and on the advantages of inputs to allow mass production of farm products. He argues that the transformation in the agricultural sector of our economy was not a result of increased farm production efficiency. Farmers produce at a scale beyond lowest average explicit input cost in order to achieve sufficient revenues from smaller marginal returns to provide a gross return sufficient to cover the implicit input costs of the farmer's investment and time (Smith, 1992a; Peterson, 1997). To remain competitive, farmers modified their practices according to their new-found perceptions of the new demands of the marketplace.

The Census of Agriculture (U.S. Department of Commerce, various years) documented a major national trend in the years following World War II. The number of farms in the nation decreased almost 50 percent from 5.8 million in 1945 to 2.7 million in 1969, while the average farm size almost doubled from 79 hectares to 157 hectares. These trends of decreasing numbers of farms and

increasing farm size continued in the U.S. national averages from 1969 on. In 1997, the number of farms in the United States was at the lowest point ever (Figure 1.3). There were fewer than two million farms (1,911,859), and average farm size was up to 197 hectares (Figure 1.4). Not all the farm loss throughout the nation was the result of larger farms taking over smaller farms; a considerable portion of the land was abandoned or went into other uses. From 1945 to 1969, there was a decline in overall land on farms of 32 million hectares, an 8 percent loss of farmland. This national trend continued during the period covered by this Massachusetts study and is predicted to continue into the future (USDA Economic Research Service, 1999a).

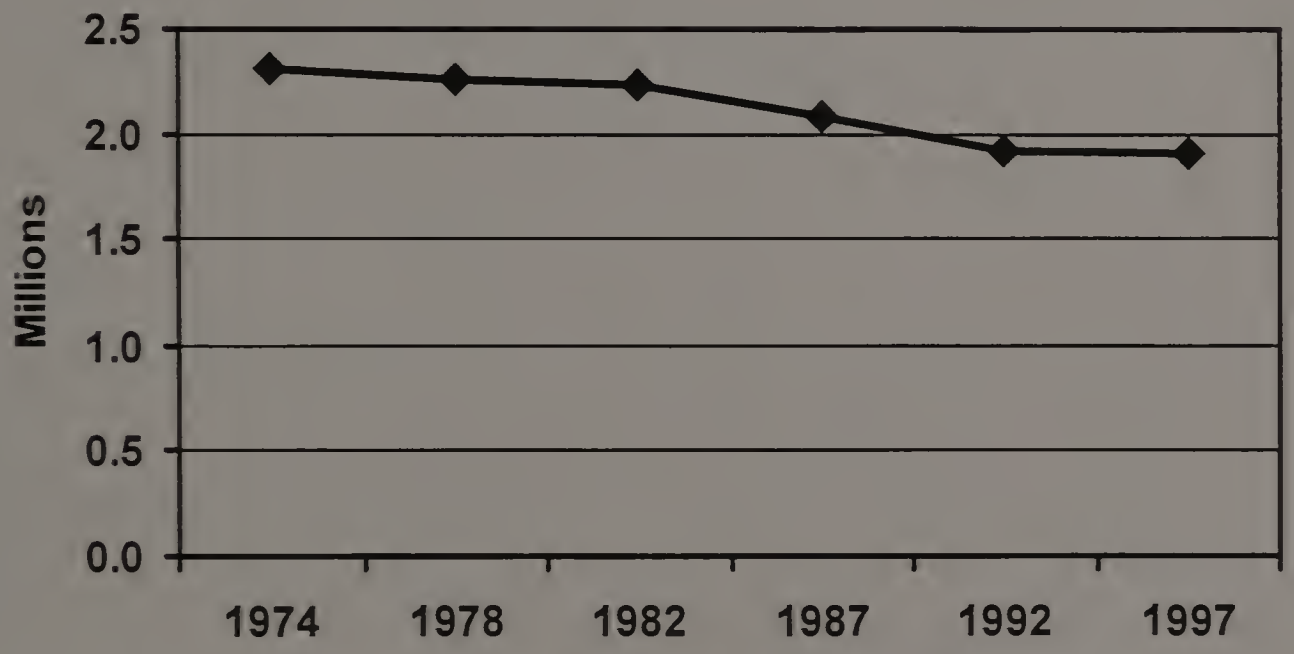

Figure 1.3. Number of farms in the United States, 1974-1997.
Source of data: U.S. Census of Agriculture.

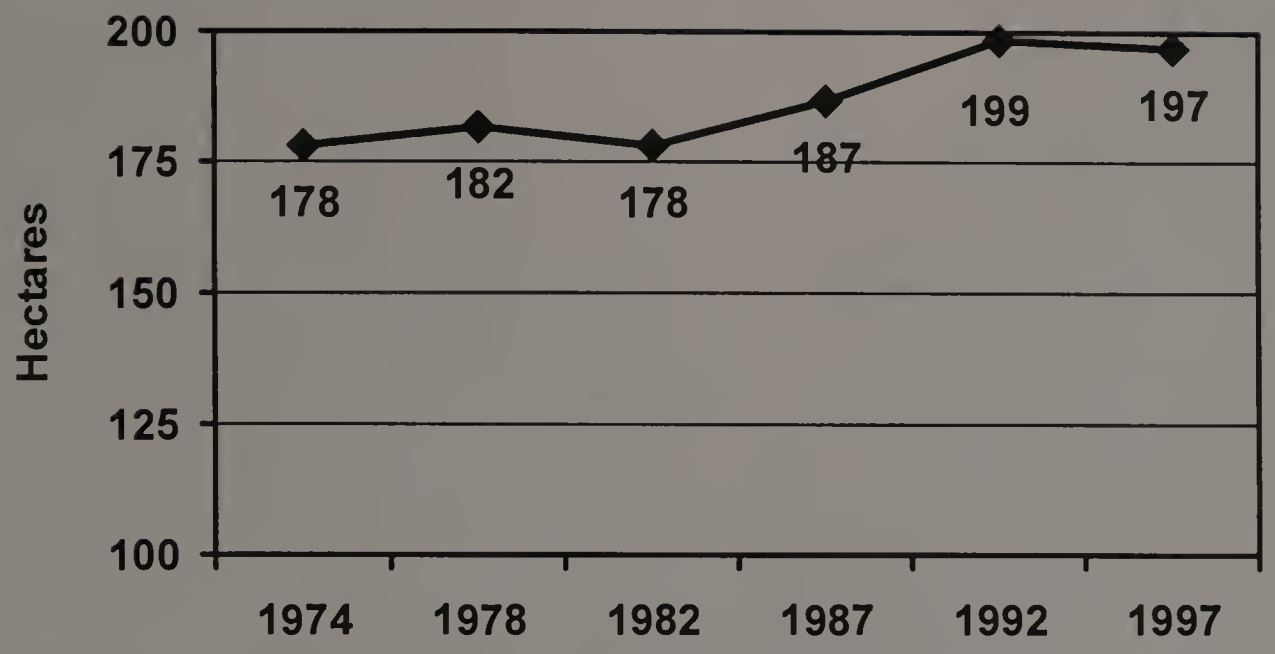

Figure 1.4. Average size of U.S. farms, 1974-1997.
Source of data: U.S. Census of Agriculture.

Massachusetts Historical Trends, 1945-1969

The trends in Massachusetts agriculture were similar to national trends from 1945 to 1969. Experiencing intense competition from outside the state, many farmers gave up farming. Their land was taken over by larger farms, abandoned, or used for development. By the end of 1969, the number of farms in Massachusetts had decreased, from 37,007 in 1945 to 5,703 in 1969 (Figure 1.5). Average farm size had increased, from 23 hectares to 50 hectares (Figure 1.6). Overall agricultural product sales remained constant in nominal dollars (Figure 1.7). Overall land on farms decreased, from 841,108 hectares to 283,524 hectares (Figure 1.8). The significant loss of 85 percent of the farms in Massachusetts and decrease in farmland, from 41.1 percent to 33.3 percent of the state land, represented a dramatic downfall for Massachusetts agriculture. It prompted a study in 1975 by researchers who made the following dire prediction:

"If present trends continue, commercial agriculture will vanish entirely from Massachusetts by 1990, except for local specialties such as cranberries and horticultural products" (Platt et al., p. i).

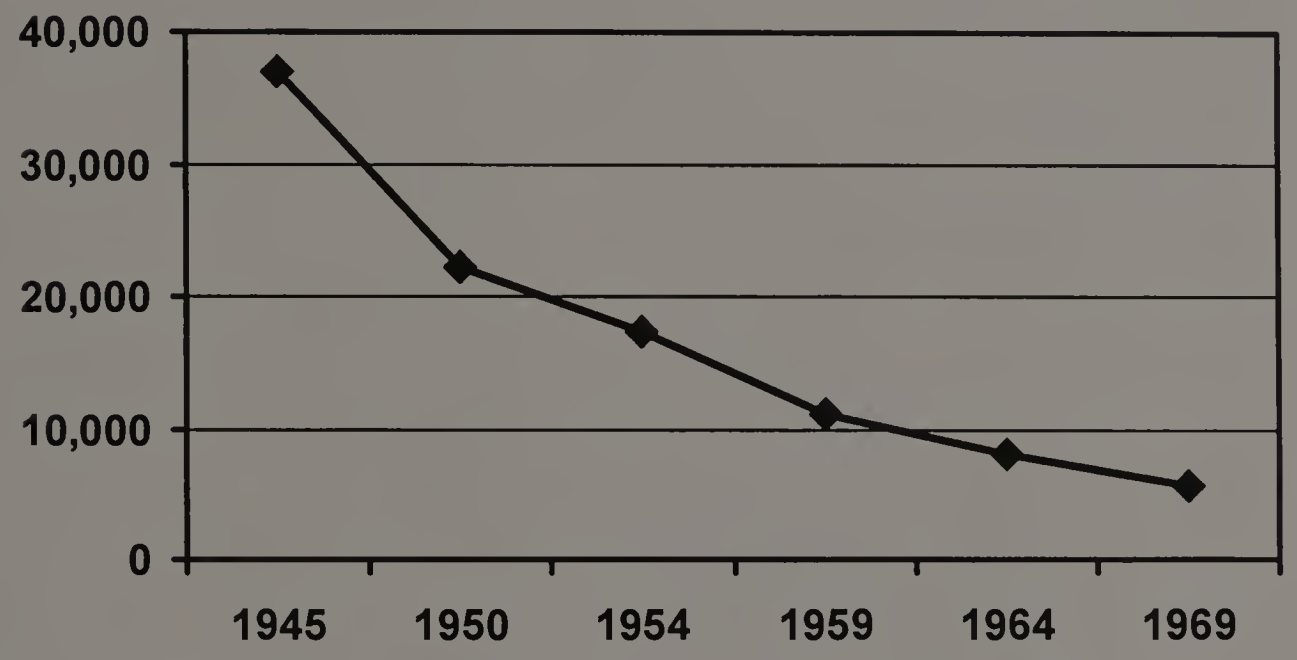

Figure 1.5. Number of farms in Massachusetts, 1945-1969.
Source of data: U.S. Census of Agriculture.

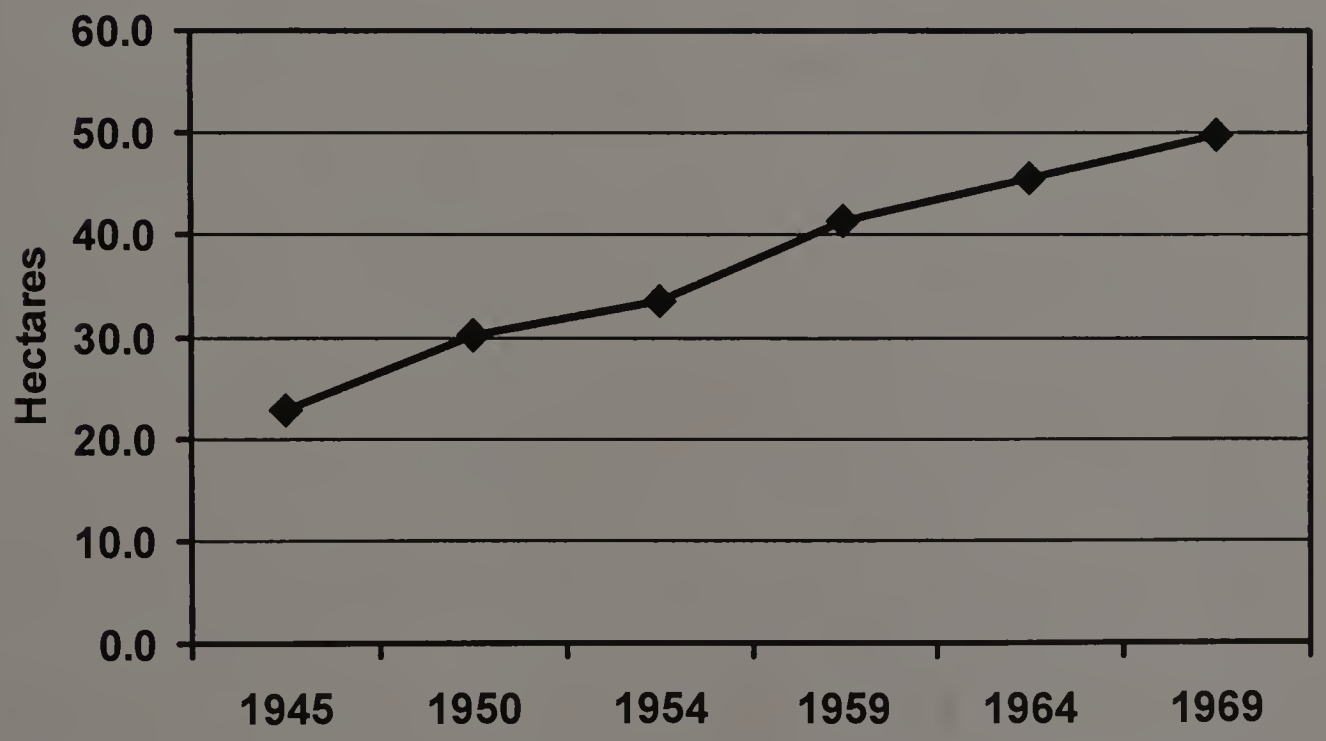

Figure 1.6. Average size of farms in Massachusetts, 1945-1969.
Source of data: U.S. Census of Agriculture.

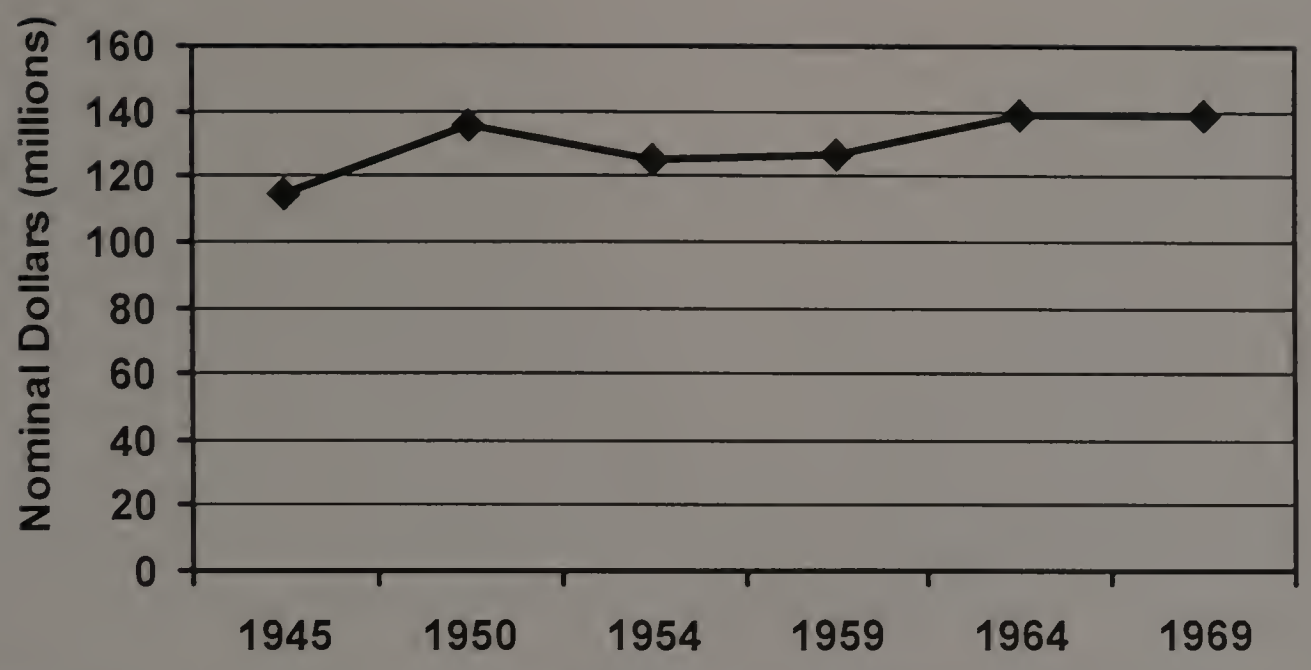

Figure 1.7. Farm product sales in Massachusetts, 1945-1969.
Source of data: U.S. Census of Agriculture.

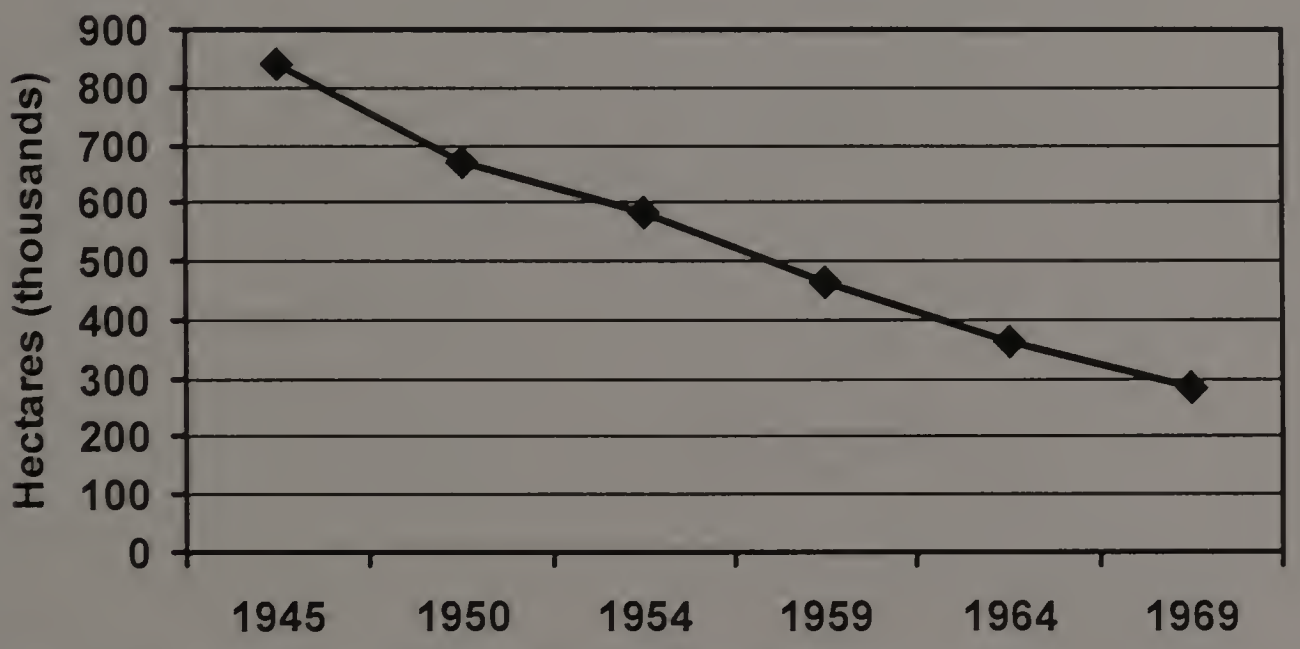

Figure 1.8. Land on farms in Massachusetts, 1945-1969.
Source of data: U.S. Census of Agriculture.

In a study documenting Massachusetts farmland loss from 1951 to 1971, Christensen, Foster, and Marion (1976) reported a 23 percent loss of Classes 1 and 2 lands, the best agricultural soils as designated by the Soil Conservation Service of the U.S. Department of Agriculture; a 25 percent loss of land in

Classes 3 and 4, soils moderately good for agriculture; and a 55 percent loss of land in Classes 5 through 8, soils poor for agriculture. Another report covering the same period cited two major causes of agricultural land loss: increasing land values and the loss of agriculture related support industries (Braiterman et al., 1976).

Using the Agricultural Census reports of 1925 through 1955, Goorian (1958) presented a regional analysis of seven major enterprises, ranking them based on the amount of labor employed. Dairy production required the most labor, utilized more farmland, and was more widespread across the state than any other enterprise (1958, p. 37). Poultry was second in importance, followed by vegetables, cranberries, tobacco, potatoes, and treefruits. Goorian noted a significant loss in agriculture from 1925 to 1955, with decreased land area devoted to potatoes and a reduction by 65 percent in numbers of apple trees, 20 percent in numbers of cows, and 65 percent in the number of dairy herds.

The Massachusetts Agricultural Viability Study, released in December 1982, documented the continued decline of Massachusetts agriculture (Bailey et al., 1982). The conclusions of the study were that farmers in Massachusetts were at a disadvantage because of the high expense of farmland, limited availability of large tracts of land, high costs of agricultural inputs and imported feed grains, high taxes on farmland and buildings, and the considerable number of competing non-agricultural demands for land. The study predicted that the

future viability of agricultural enterprises would be found in high value fruit and vegetable crops, while enterprises requiring extensive lands, such as dairy and livestock operations, would disappear.

The Pioneer Valley Planning Commission, in its report of 1987 cited the biggest problems for farmers to be the lack of availability of labor and its high cost. Not having succession of the farm from one generation to the next was also found to be a common problem because 42 percent of farmers surveyed did not report to have successors to replace them.

Using the Census of Agriculture through 1992, Nnaji (1997) warned that continued loss of agriculture could lead to an irreversible limiting of agricultural capacity and rural economic development. To Nnaji, the state of Massachusetts agriculture appeared bleak. The report indicated little positive outlook for Massachusetts agriculture except for fruits and vegetables. The implication was that Massachusetts farmers were rapidly succumbing to economic pressures by leaving agriculture.

The Challenge of Being a Massachusetts Farmer

Since Colonial times, the populace of Massachusetts has held fast to its cherished legacy as an agricultural state. The first farmers in Massachusetts, Native American Indians, lived off the bounty of the fertile land and pristine

coastal waters, rivers, and lakes (Cronon, 1983). Attracted by these abundant natural resources, white settlers homesteaded in New England and created a Massachusetts Colony. Over time, communities of farmers, craftspeople, and trades people were formed. Many individual farmers prospered, making it possible for their next generations to continue to work their farms, decade after decade. In spite of such challenges as the hilly terrain, rocky fields, and moderately severe northern climate, Massachusetts farmers persevered during the last two hundred years, perhaps due to their "Yankee" virtues such as determination, adaptability, and practicality. (Ebeling, 1979, pg 74-75; Rasmussen, 1975; Russell, 1976)

Massachusetts farmers have a compelling disadvantage in that they cannot readily develop profitable large-scale, industrialized operations because of the inherent limitations of the state's hilly, rocky terrain and northern climate. The competitive edge of states such as Florida, Texas, and California, where large-scale farm operators flourish with the benefits of level open fields and a mild climate, has compromised the prominence of Massachusetts agriculture. Today, the traditional image of Massachusetts as an agricultural state has paled in the minds of many as a result of post-Word War II ever-increasing industrial and residential development (Dukakis, 1984).

Food Self-Sufficiency

In the 1970s, public apprehension about the vulnerability of the food system led to discussions about regional food self-reliance (Christensen et al., 1976; The Cornucopia Project, 1982). Concerns included high fuel cost and its impact on food transportation; strikes in the trucking industry; natural disasters; loss of farms, farmland and soils; farm indebtedness; overdependence on pesticides and chemical fertilizers; the possibility of damaging insect and disease outbreaks; foreign competition in fishing; and the threat of the contamination of fisheries (Engel, 1983). Manuals were developed as guides to calculate state self-reliance in food production. These manuals included recommended action steps for consumers, farmers, researchers, and government officials (Tyrrell, 1982).

Several techniques have been used to calculate self-sufficiency in food production. Gingrich and Madden (1979) expressed the Northeast region's production for individual commodities as a percentage of national production and then contrasted this production level to the region's percentage of the national population. This method of calculation ignored international trade and assumed that per-capita consumption in the Northeast was the same as that of national consumption. Gingrich and Madden included Pennsylvania, New York, New Jersey, and the New England states in their study. They found that in 1974 the Northeast had 23.5 percent of the nation's population, but farm production

represented only 7.6 percent of the nation's livestock receipts and 3.3 percent of crop receipts. For the Northeast, from 1955 to 1975, the region's self-sufficiency declined in all major agricultural products except for cabbage, milk, hogs, and grapes. The researchers reported production ratios for selected products but did not report overall self-sufficiency ratios for individual states.

Christensen, Foster, and Marion (1976) reported self-sufficiency ratios for selected crops and found that 25 percent of food requirements had to come from outside the region due to the need for seasonal imports and crops that could not be grown in the Massachusetts climate. The researchers found that Massachusetts had more than 100 percent self-sufficiency in fresh sweet corn and cranberries, whereas its self-sufficiency was 81 percent in apples, 96 percent in fresh strawberries, 49.5 percent in milk, 30.5 percent in eggs, and 41.5 percent in asparagus. For the New England region, the researchers reported 89.9 percent self-sufficiency in eggs and 209 percent self-sufficiency in potatoes. They concluded that "self-sufficiency is possible for a number of products. Self-sufficiency in others is an untenable goal both in a technical and economic sense." "The production of those products where we have a competitive advantage or where it may be possible to create a competitive advantage should be supported and promoted" (Christensen et al., 1976, p. 6).

Another method used to calculate self-sufficiency in food production was to contrast consumer expenditures to the retail value of production. One

variation of this method used to determine retail value of production consisted of identifying farmgate production data for each commodity, adjusting it to a retail weight, and multiplying it by a retail value. The retail value of consumption was calculated by using the quantity of consumption for each food group item and multiplying by retail value for that item. Adjustments were made for imports and exports to calculate the land base needed for 100 percent production. Using this method, Engel reported that Massachusetts imported 93 percent of its food overall, 78 percent of its fresh fruits, and 77.3 percent of its fresh vegetables. He also calculated that Massachusetts had the climate and soils to grow 43 percent of its fresh fruit and 90 percent of its fresh vegetables.

Bahn and Christensen (1979) also contrasted consumer expenditures to the retail value of production. They used consumption data directly from published reports on consumer expenditures and production data from the Census reports on sales from farms. Starting with data in dollars simplified the calculations, allowing for accuracy at the state level without considering imports and exports. Bahn and Christensen reported an analysis for each of the New England states, including all the major food groups. An in-depth discussion of the researchers' method is included in Chapter III, where their results serve as a baseline index to compare 1997 production and consumption levels for the New England states.

Research Objectives of the Dissertation

This dissertation reports an analysis of the state of agriculture in Massachusetts according to the following overall objectives:

- To define the scope and significance of agricultural production in the Commonwealth and its fourteen counties over the last quarter of a century.
- To quantify the value of agricultural production to the state's economy through the use of secondary data extracted from the U.S. Census of Agriculture and from other research reports.
- To describe changes in the net level of food self-sufficiency for the state over the last quarter century.

This dissertation reports the status of agricultural production in Massachusetts and its level of food self-sufficiency by using data from the U.S. Census of Agriculture and other statistical reports on food production and consumption. The implications of these bodies of evidence should prove very useful to a number of constituencies, including Massachusetts farmers, the business community, and public and private agricultural officials. Based on this up-to-date information, those interested in agriculture in Massachusetts will be able to develop a comprehensive, realistic understanding of the present and future of agriculture in the Commonwealth.

CHAPTER II

MASSACHUSETTS AGRICULTURE FROM 1974 TO 1997

State Overview

The U.S. Agricultural Census reports from 1974 through 1997 indicate that Massachusetts farmers increased crop sales but reduced livestock sales (Figure 2.1). These trends held true when dollar values were adjusted with the Producer Price Index for farm products (Figure 2.2). The greatest sale increases occurred in these broadly defined commodity groups: fruits, nuts and berries; tobacco; nursery and greenhouse crops; and vegetables, sweet corn and melons (Table 2.1). Losses occurred in all livestock enterprises, most significantly in dairy.

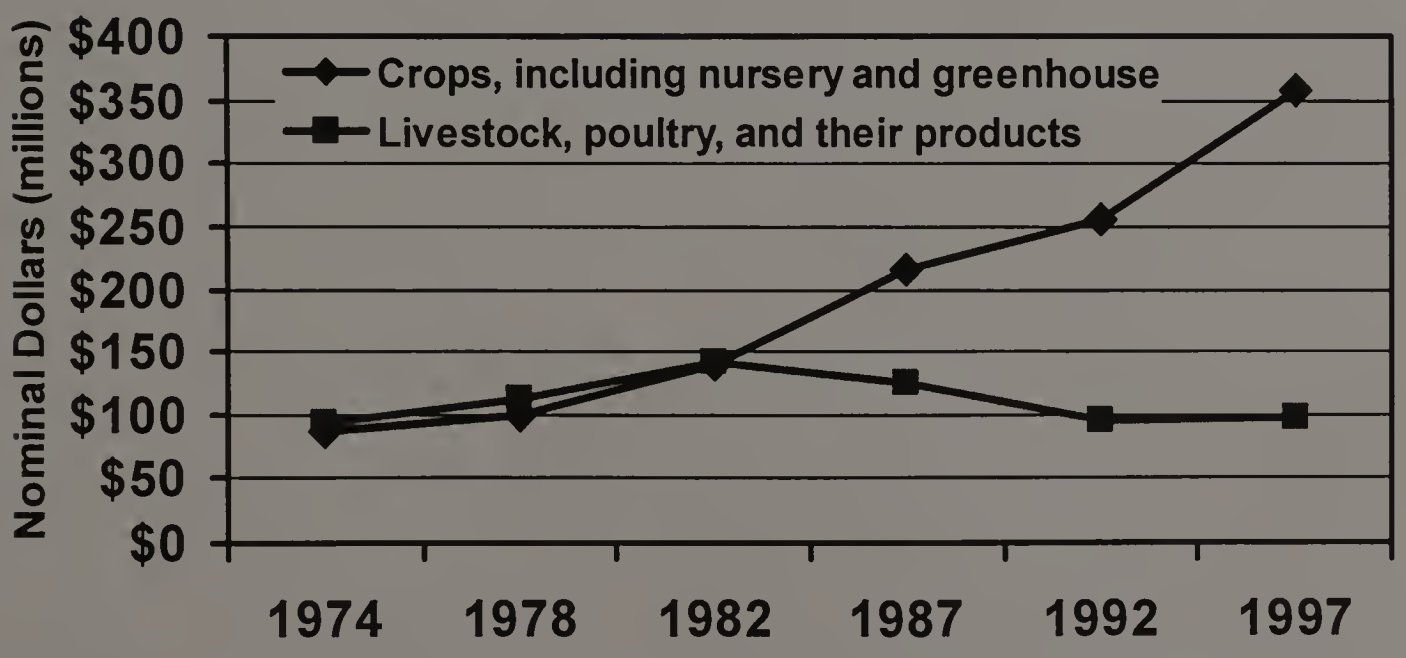

Figure 2.1. Crop and livestock sales in Massachusetts, 1974-1997.
Source of data: U.S. Census of Agriculture.

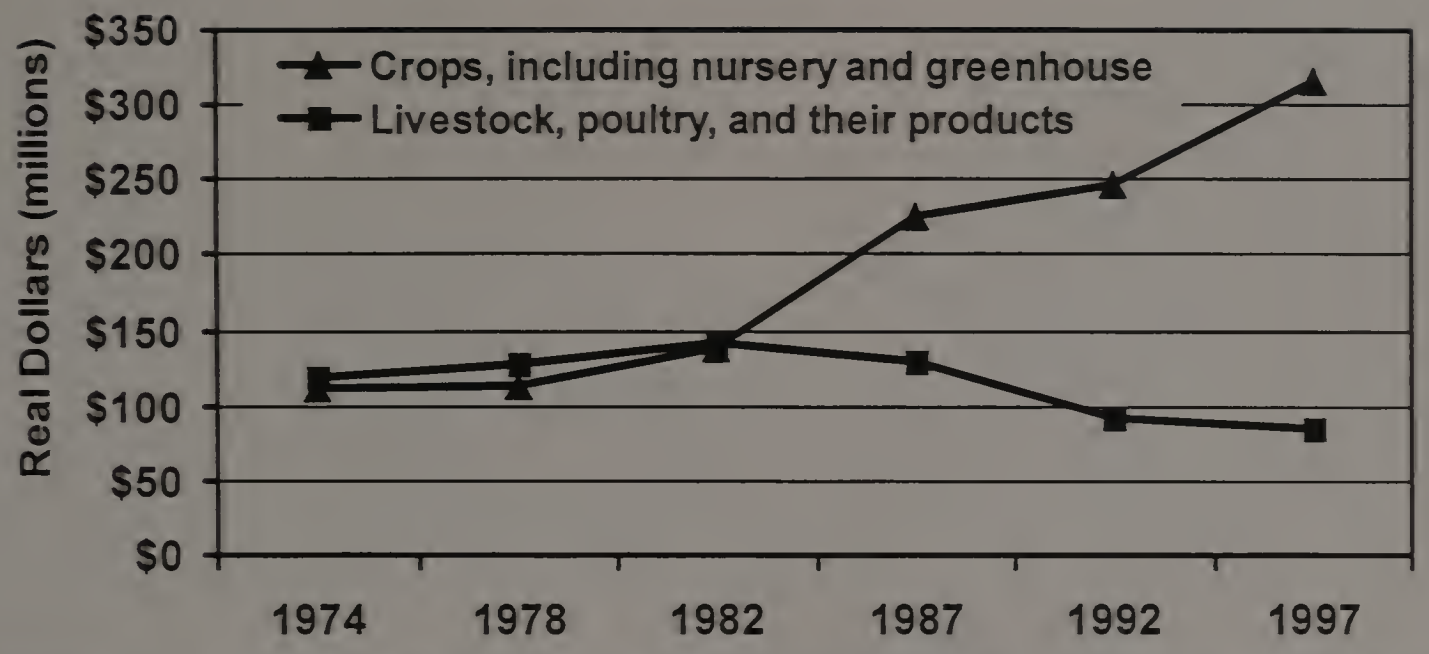

Figure 2.2. Crop and livestock sales in Massachusetts, 1974-1997, adjusted by the Producer Price Index for farm products.
Source of data: U.S. Census of Agriculture.

Table 2.1. Sales from Massachusetts farms, 1978-1997, in nominal dollars.

	1978	1987	1997
	thousands		
Total sales	$211,994	$340,464	$454,404
Crops			
Fruits and berries (including cranberries)	$30,426	$92,349	$148,247
Nursery and greenhouse crops	$41,032	$80,867	$128,192
Vegetables, sweet corn, melons	$13,450	$25,179	$37,438
Tobacco	$6,985	$4,587	$23,807
Hay, silage and feed sales	$4,469	$7,803	$11,056
Other crops	$3,395	$4,285	$7,326
Grains	$321	$785	$1,310
Livestock			
Dairy and milk products	$61,549	$63,309	$59,773
Poultry and eggs	$18,504	$23,149	$15,900
Cattle and calves	$12,181	$11,297	$6,424
Hogs and pigs	$5,255	$4,220	$2,265
Sheep, lambs and wool	$230	$884	$475

Source of data: U.S. Census of Agriculture.

An indicator of profitability for the Massachusetts farm economy is net farm income: returns to the farm operator after paying expenses. Total net farm income declined from 1949 until the 1970s, but then dramatically reversed its downward trend over the next two decades (Figure 2.3). By 1997, it had climbed to a record high; Massachusetts ranked fourteenth of all states in net farm income per farm operation and fourth in net farm income per hectare. Net cash returns in nominal dollars increased from 5,448 to 24,460 per farm (Figure 2.4).

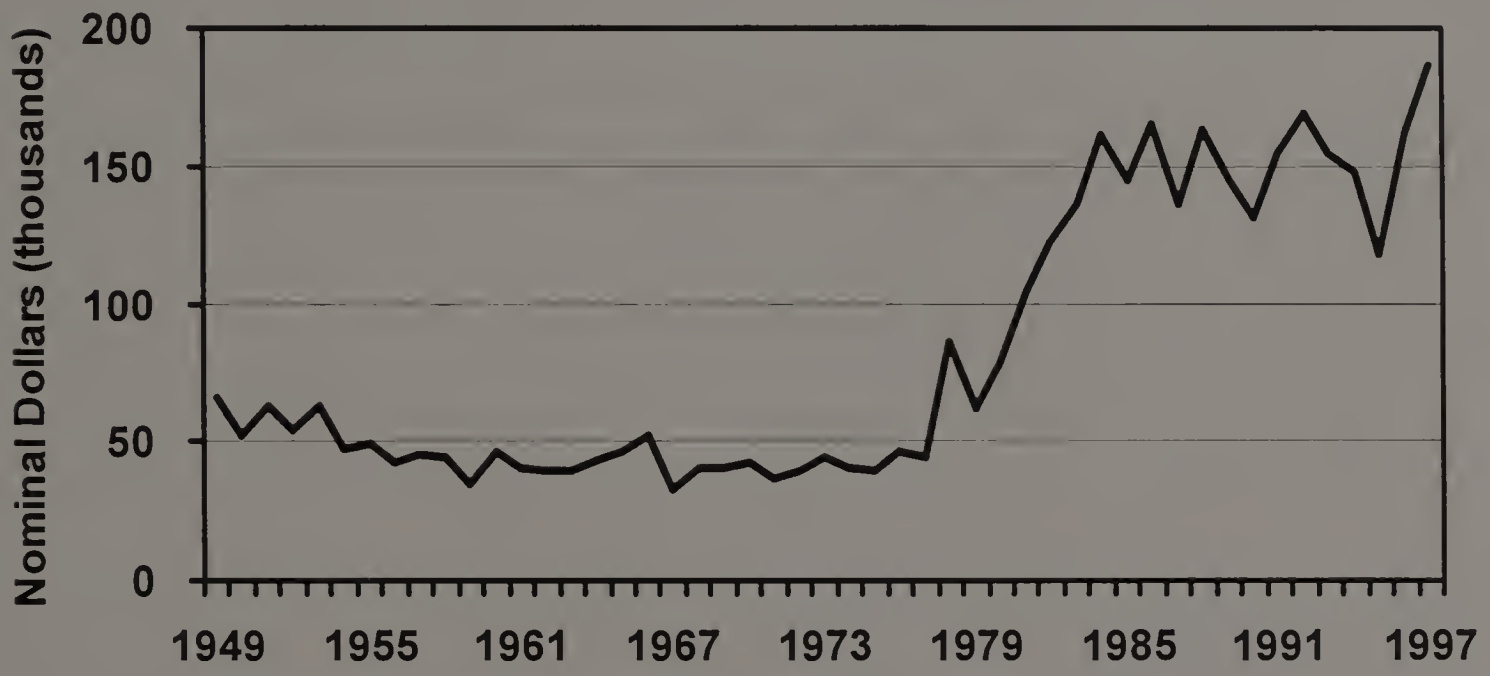

Figure 2.3. Net farm income for Massachusetts, 1949-1997.
Source of data: USDA, Economic Research Service.

Overall, the Census showed that in 1997 the Massachusetts agricultural economy was the strongest it had ever been. From 1974, agricultural product sales increased in both nominal and real terms, reaching $454 million, in nominal terms in 1997 (Figure 2.5). The numbers presented a hopeful picture, indicating that Massachusetts farmers improved production, marketing, and financial management (Table 2.2; Table 2.3).

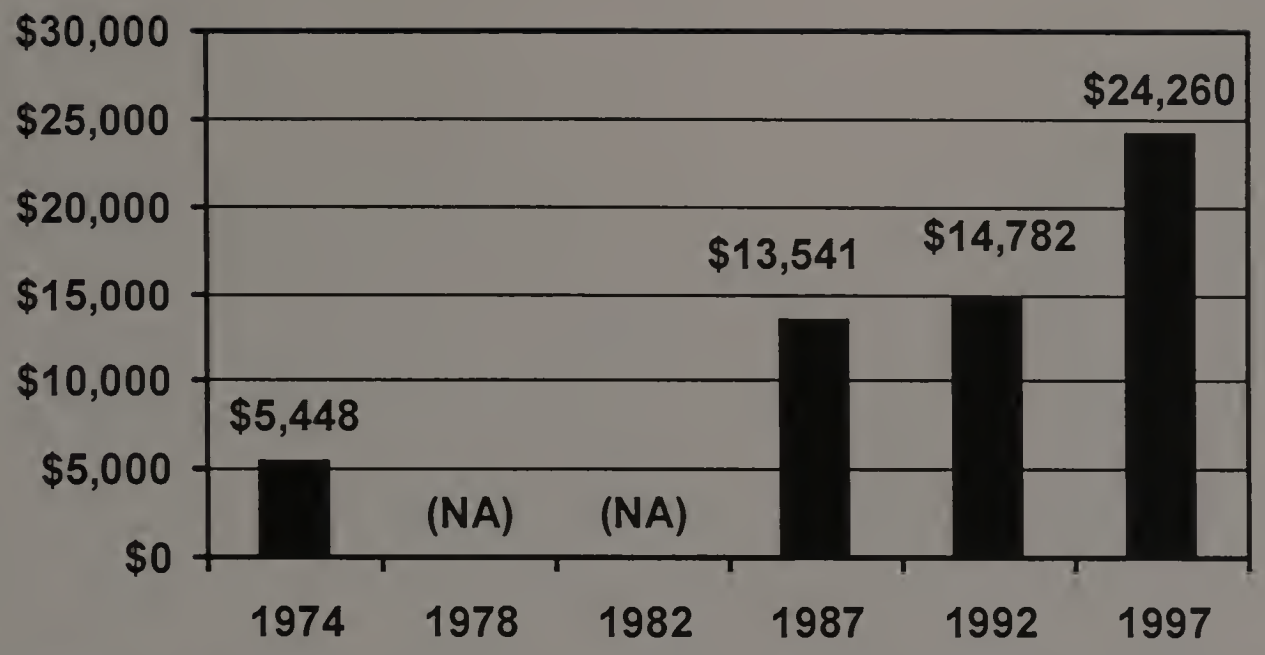

Figure 2.4. Net cash returns, average per Massachusetts farm, 1974-1997.
(NA) = data not available for these Census years.
Source of data: U.S. Census of Agriculture.

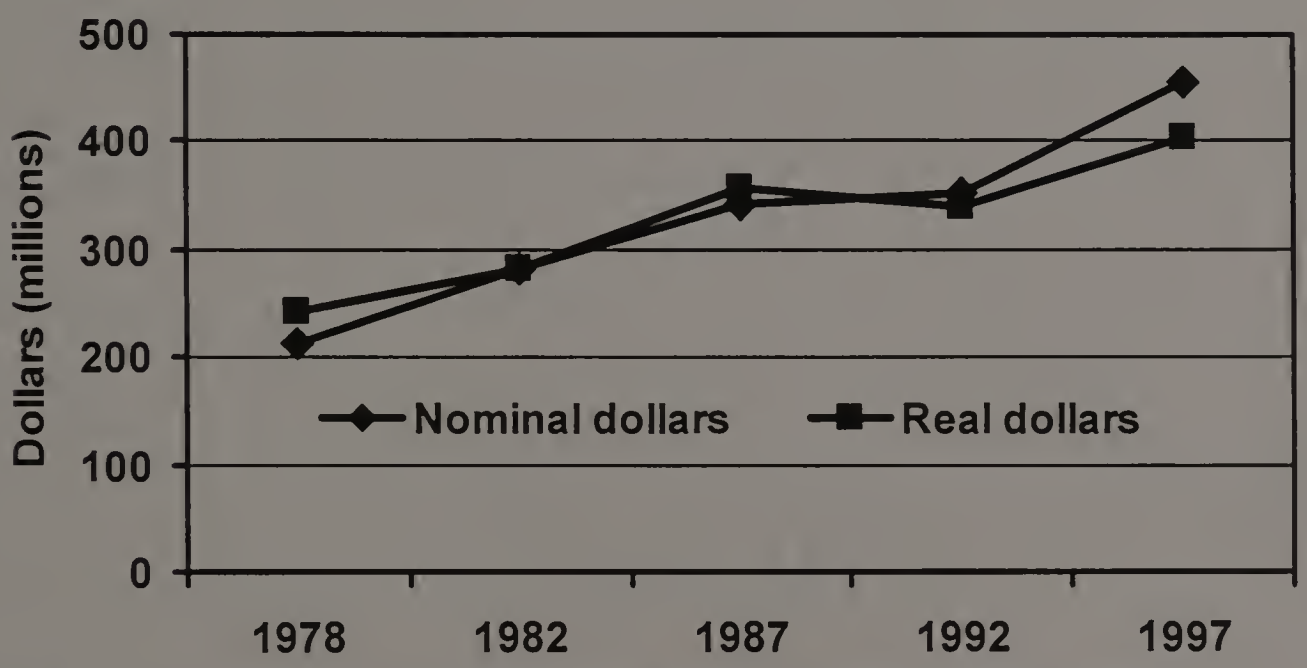

Figure 2.5. Farm product sales in Massachusetts, 1974-1997.
Real dollar adjustments made using the Producer Price Index for farm products.
Source of data: U.S. Census of Agriculture.

Table 2.2. Agricultural product sales, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	4,497	4,946	5,401	6,216	5,258	5,574
Total sales, ($1,000)	$179,653	$211,994	$281,436	$340,464	$350,639	$454,404
Total sales adjusted by PPI ($1,000)	$232,110	$241,726	$281,436	$356,507	$338,455	$402,840
Average sales per farm	$39,950	$42,862	$52,108	$54,772	$66,687	$81,522
Average sales per farm, adjusted by PPI	$51,615	$48,873	$52,108	$57,353	$64,370	$72,271
All crops (farms)	3,033	3,427	3,260	3,820	3,562	4,029
All crops ($1,000)	$86,453	$100,829	$139,428	$215,855	$255,138	$357,377
grains (farms)	(NA)	65	86	78	67	81
grains ($1,000)	(NA)	$321	$836	$785	$907	$1,310
tobacco (farms)	(NA)	44	46	21	27	68
tobacco ($1,000)	(NA)	$6,985	$2,494	$4,587	$6,678	$23,807
hay, silage, and field seeds (farms)	(NA)	1,090	1,248	1,569	1,393	1,435
hay, silage, and field seeds ($1,000)	(NA)	$4,469	$5,624	$7,803	$9,771	$11,056
vegetables, sweet corn, melons (farms)	(NA)	968	1,011	1,007	994	931
vegetables, sweet corn, melons ($1,000)	(NA)	$13,450	$19,199	$25,179	$26,984	$37,438
fruits, nuts, and berries (farms)	(NA)	907	1,002	1,186	1,160	1,142
fruits, nuts, and berries ($1,000)	(NA)	$30,426	$60,925	$92,349	$118,339	$148,247
nursery and greenhouse crops (farms)	653	749	716	824	920	1,375
nursery and greenhouse crops ($1,000)	$37,063	$41,032	$46,465	$80,867	$88,018	$128,192
other crops (farms)	(NA)	158	134	114	116	300
other crops ($1,000)	(NA)	$3,395	$3,884	$4,285	$4,440	$7,326

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

(continued on next page)

Table 2.2. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	2,396	3,144	2,904	2,932	2,214	2,089
All livestock ($1,000):	$92,464	$113,846	$142,008	$124,609	$95,500	$97,027
poultry and poultry products (farms)	417	458	508	498	396	375
poultry and poultry products ($1,000)	$24,134	$18,504	$25,456	$23,149	$12,298	$15,900
dairy products (farms)	(NA)	902	879	609	475	353
dairy products ($1,000)	(NA)	$61,549	$80,840	$63,309	$60,430	$59,773
cattle and calves (farms)	(NA)	1,803	1,908	1,725	1,271	1,158
cattle and calves ($1,000)	(NA)	$12,181	$12,212	$11,297	$10,070	$6,424
hogs and pigs (farms)	(NA)	435	451	387	296	269
hogs and pigs ($1,000)	(NA)	$5,255	$4,497	$4,220	$2,342	$2,265
sheep, lambs, and wool (farms)	(NA)	280	398	563	466	396
sheep, lambs, and wool ($1,000)	(NA)	$230	$445	$884	$557	$475
other livestock, livestock products (farms)	(NA)	479	560	722	546	557
other livestock, livestock products ($1,000)	(NA)	$14,195	$18,559	$21,749	$9,802	$12,190

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.3. Selected farm data for Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 2,030,093						
Land in farms (hectares)	243,522	249,845	248,008	248,965	213,050	209,756
Total cropland (hectares)	104,021	111,975	107,596	110,316	95,219	90,480
Irrigated land (hectares)	7,492	6,780	7,014	8,158	8,057	9,941
Average size of farm (hectares)	54	51	46	40	40	38
Farms (number)	4,497	4,946	5,401	6,216	5,258	5,574
Estimated market value, nominal dollars						
land and buildings: average per farm	$128,535	$183,339	$205,677	$346,530	$460,410	$455,014
land and buildings: average per hectare	$2,375	$3,566	$4,851	$8,779	$12,103	$12,866
machinery and equipment: average per farm	$19,729	$24,507	$28,429	$32,039	$36,359	$40,395
Total farm production expenses						
($1,000 nominal)	$155,157	(NA)	(NA)	$251,496	$266,163	$311,068
average per farm (dollars)	$34,502	(NA)	(NA)	$40,460	$50,621	$55,897
Net cash return from sales						
total ($1,000 nominal)	$24,496	(NA)	(NA)	$84,172	$77,725	$135,155
average per farm (dollars)	$5,448	(NA)	(NA)	$13,541	$14,782	$24,260
number of farms with net gains	(NA)	(NA)	(NA)	3,017	2,556	2,861
number of farms with net losses	(NA)	(NA)	(NA)	3,199	2,702	2,710
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$1,780	$2,478	$1,997
Government payments ($1,000)	(NA)	(NA)	(NA)	$2,213	$1,886	$1,209
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$2,163	$2,494	$3,484
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$477	$486	$598

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

(Continued on next page)

Table 2.3. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	1,057	1,397	(NA)	1,080	1,226
total (nominal dollars in thousands)	(NA)	$9,564	$15,291	(NA)	$14,982	$19,825
average per farm (nominal dollars)	(NA)	$9,048	$10,945	(NA)	$13,872	$16,170
Operators by principal occupation						
Farming	2,560	2,852	2,941	3,174	2,926	2,927
Other	1,604	2,094	2,460	3,042	2,332	2,647
Average age of operator (years)	54.2	52.5	51.5	52.6	53.8	54.9
Operators by days worked off farm						
None	1,672	2,197	2,121	2,371	2,239	2,285
Any	1,815	2,520	2,897	3,516	2,695	2,980
200 days or more	1,157	1,623	1,838	2,283	1,666	1,864
Farm employment, hired farm labor						
farms with hired farm labor	1,913	2,573	2,412	(NA)	1,847	2,188
hired farm labor (number workers hired)	25,365	23,027	17,458	(NA)	12,469	13,930
hired farm labor (payroll in thousands)	$31,561	$40,380	$43,109	$66,579	$77,337	$81,630
working 150 days or more (workers)	4,520	5,801	5,153	(NA)	4,024	4,635
working fewer than 150 days (workers)	20,845	17,226	12,305	(NA)	8,445	9,295
Year 1997 top commodity group sales	nominal dollars in thousands					
fruits, nuts, and berries	(NA)	$30,426	$60,925	$92,349	$118,339	$148,247
nursery and greenhouse crops	$37,063	$41,032	$46,465	$80,867	$88,018	$128,192
dairy products	(NA)	$61,549	$80,840	$63,309	$60,430	$59,773
vegetables, sweet corn, and melons	(NA)	$13,450	$19,199	$25,179	$26,984	$37,438
tobacco	(NA)	$6,985	$2,494	$4,587	$6,678	$23,807
poultry and poultry products	$24,134	$18,504	$25,456	$23,149	$12,298	$15,900

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

Financial, Irrigation, and Marketing Numbers

Analysis of the agricultural sector's balance sheet shows the conservative strategy of Massachusetts farmers that had enhanced their economic survival by providing financial stability (Table 2.4). Debt-to-asset ratios on Massachusetts farms averaged 12 percent from 1960 to 1997 but only 9.2 percent from 1988 to 1997. In contrast, U.S. averages were 17 percent and 16 percent, respectively. Massachusetts farmers were apparently more successful in avoiding the quagmire of debt compared to their counterparts in other states.

Table 2.4. Financial ratios indicating solvency and profitability, averages for farms in Massachusetts and the United States.

	Massachusetts		United States	
	1960-1997	1988-1997	1960-1997	1988-1997
Debt to assets	12.0	9.2	17.0	16.0
Debt to equity	13.7	10.2	20.6	19.1
Rate of return on assets				
from current income	1.3	1.8	3.1	3.5
from real capital gains	3.7	2.3	1.1	1.2
Total	5.0	4.1	4.2	4.6
Rate of return on equity				
from current income	0.5	1.2	2.1	2.5
from real capital gains	4.9	2.9	2.0	1.9
Total	5.4	4.1	4.1	4.4

Source: USDA, Economic Research Service. 1999. Data from the web at http://www.ERS.USDA.gov/data/farmbalancesheet/fbsdmu.htm.

In agriculture, rates of return on investment consistently remained relatively low, not only for the nation but also for the state of Massachusetts (Table 2.4). For farms nationwide, the rate of return on assets from current

income averaged just 3.1 percent from 1960 to 1997. In Massachusetts, the average was only 1.3 percent. Due to the somewhat limited potential of monetary returns from farming operations, farmers had to rely on increasing property values, as measured in real capital gains, to optimize their total rate of return on assets. The rate of return on assets when calculated using real capital gains was 3.7 percent for Massachusetts farmers, much better than the average of 1.1 percent for farmers throughout the country over the same period. Combining returns on assets from farm income and real capital gains, the total rate of return for the average Massachusetts farmer was 5 percent, as compared to 4.2 percent for the average U.S. farmer. In short, Massachusetts farmers possessed a modest but distinct advantage of a higher average total rate of return over that of farmers in other states, primarily due to increasing Massachusetts property values.

Massachusetts farmers also improved profitability through installation of irrigation systems to counter the economic losses during periods of drought and to enable more intensive production of higher-value crops. The number of farms with irrigation almost doubled from 879 in 1974 to 1,630 in 1997. Twenty-nine percent of farms had irrigation capable of watering a total of 9,941 hectares in 1997 (Table 2.3). The percentage of farms with irrigation in Massachusetts was higher than that of any other state in New England. Clearly, the installation of irrigation systems during the last twenty-five years proved to be a practical investment for Massachusetts farmers. It decreased economic risks associated

with unpredictable weather conditions, improved yields, and made higher returns from specialty crops feasible.

Roadside stands, farmers' markets, pick-your-own crops, and subscription farms (community supported agriculture farms or CSAs) played a major role in the increased profitability of agriculture. Direct marketing sales nearly doubled in Massachusetts, from $9.8 million in 1978 to $19.8 million in 1997 (Figure 2.6), leading all states with a per-farm average of $3,557. Direct marketing sales represented 4.4 percent of total sales in 1997, little changed from the 4.6 percent in 1978. The average direct-marketing sales for farms utilizing direct sales was $16,170 in 1997, second nationally only to that of Rhode Island. Worcester County, Massachusetts, ranked an impressive second among of all the nation's counties for total direct-sales dollars, with 21 percent of its farms using direct-market outlets.

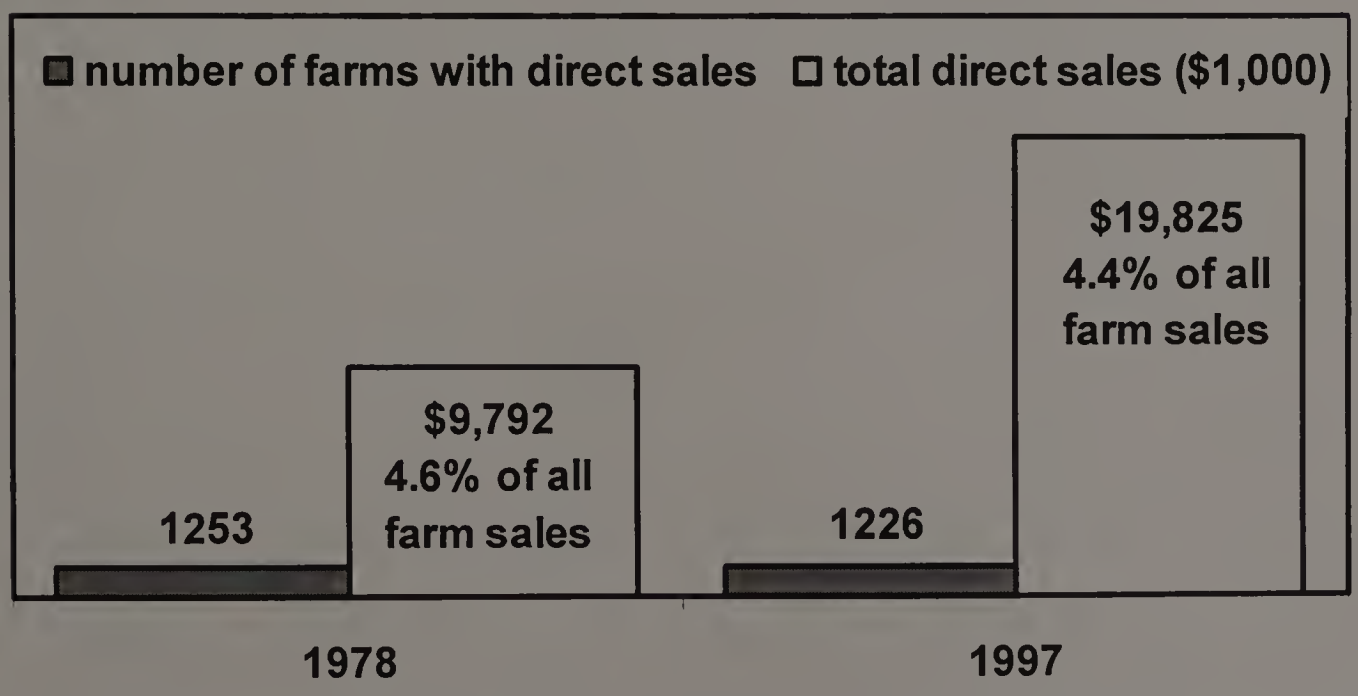

Figure 2.6. Number of Massachusetts farms with direct-to-the-consumer sales and total direct sales, 1978, 1997. Source of data: U.S. Census of Agriculture.

Number of Farms and Average Farm Size

The number of farms in Massachusetts decreased dramatically from 37,007 in 1945 to an all-time low of 4,497 in 1974. While nationwide the numbers of farms continued to decline, the state of Massachusetts trend of decreasing numbers reversed, with the number of farms increasing 24 percent to 5,574 farms by 1997 (Figure 2.7).

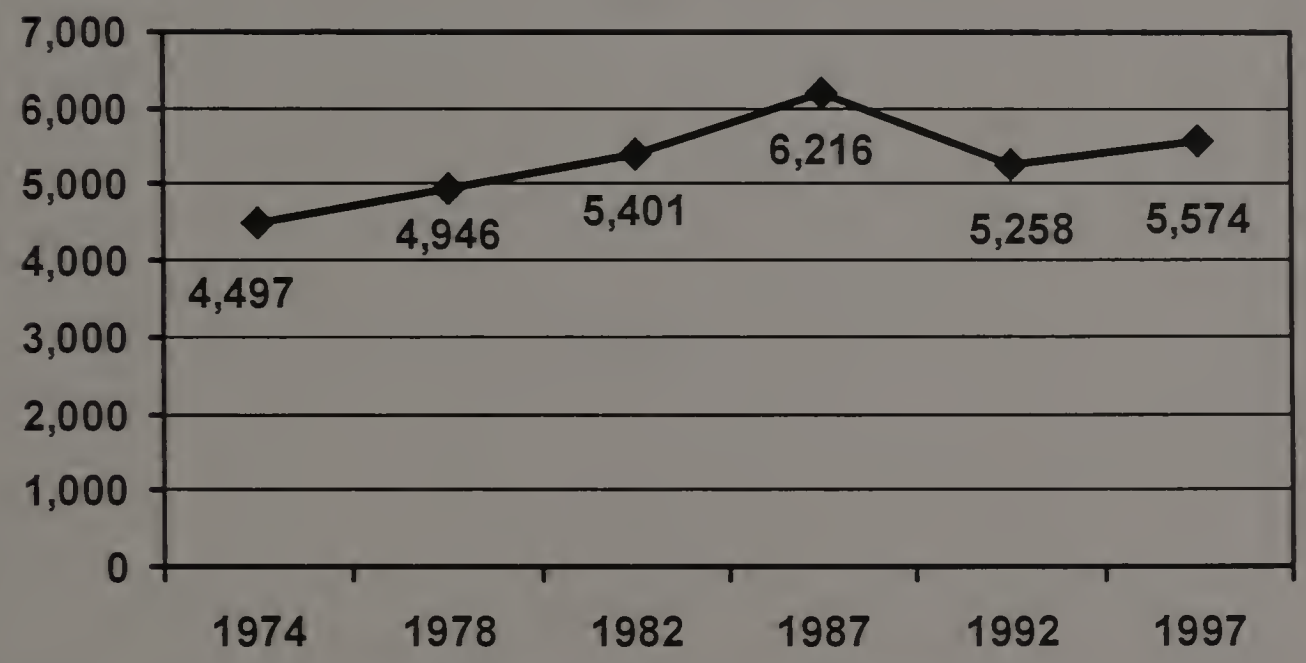

Figure 2.7. Number of farms in Massachusetts, 1974-1997.
Source of data: U.S. Census of Agriculture.

In regard to overall size of farms, national trends and state trends differed during the time period of 1974-1997. The national trend was for farmland to be steadily consolidated into fewer, but larger, farms (Lin, 1980). In contrast, a decreasing percentage of the Commonwealth's farms were larger farms. In 1974, 59 percent of farms were 20.2 hectares or larger, while this was true of just 44 percent in 1997. Moreover, an increasing number of farms were smaller

farms. Only 14 percent of farms were smaller than 4 hectares in 1974, as compared to over 22 percent in 1997 (Figure 2.8). Average U.S. farm size peaked in the 1992 Census, at 199 hectares per farm; it remained relatively unchanged at 197 hectares in 1997. Conversely, average farm size in Massachusetts declined from 54 hectares in 1974 to 38 hectares in 1997 (Figure 2.9), less than one-fifth of the average national farm size. Farmland in the state declined from 243,522 hectares in 1974 to 209,756 hectares in 1997 (Figure 2.10). Cropland decreased 13 percent from 104,021 hectares in 1974 to 90,480 hectares in 1997 (Figure 2.10). In summary, the U.S. average farm size remained large, whereas it declined in the state of Massachusetts.

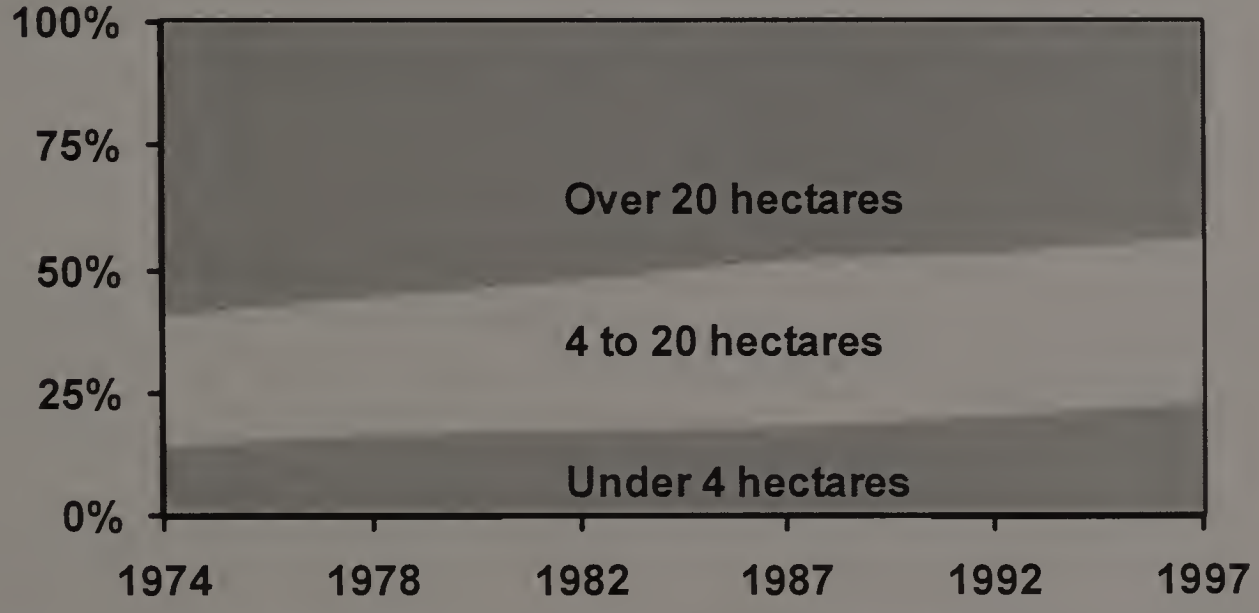

Figure 2.8. Distribution of Massachusetts farms by land on farms, 1974-1997. Source of data: U.S. Census of Agriculture.

The small size of farmland on Massachusetts farms was not the only factor distinguishing Massachusetts as a small farm state; many of its farms had relatively small sales. In 1974, 51 percent of farms had sales under $10,000. In

1997, 54 percent had sales under $10,000. The state trend was toward increased numbers of small farms with sales under $10,000 and toward increased numbers of larger farms with sales over $100,000 (Figure 2.11).

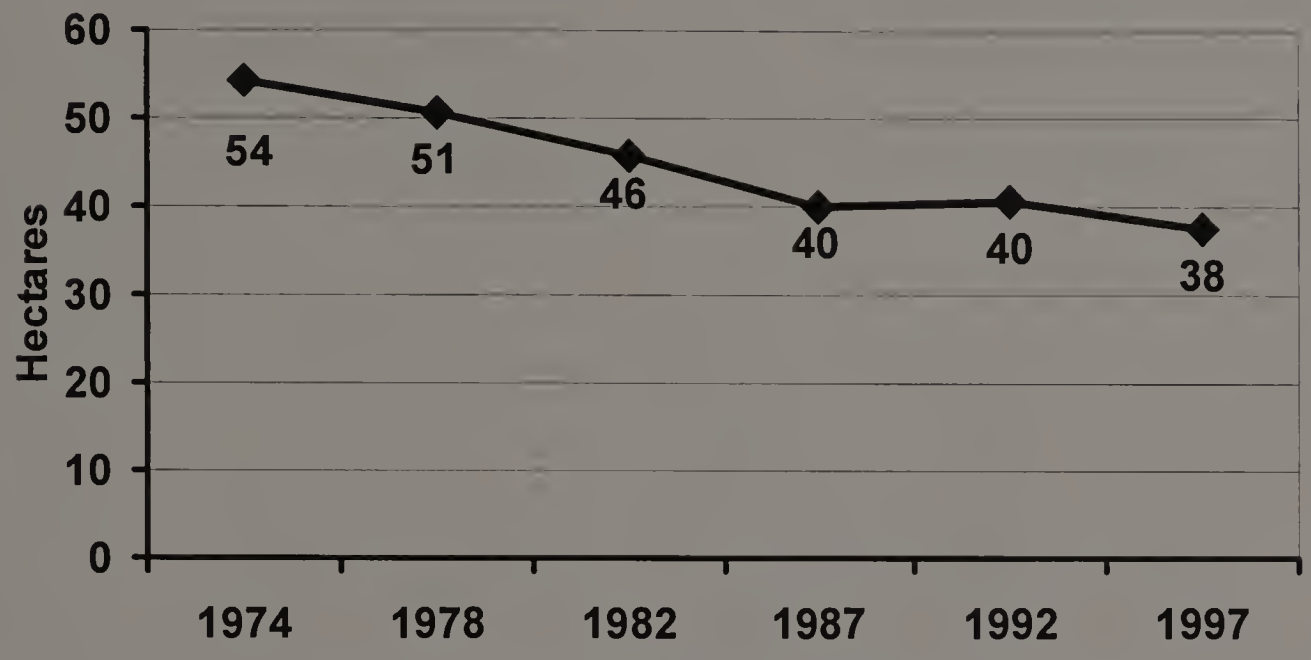

Figure 2.9. Average farm size in Massachusetts, 1974-1997.
Source of data: U.S. Census of Agriculture.

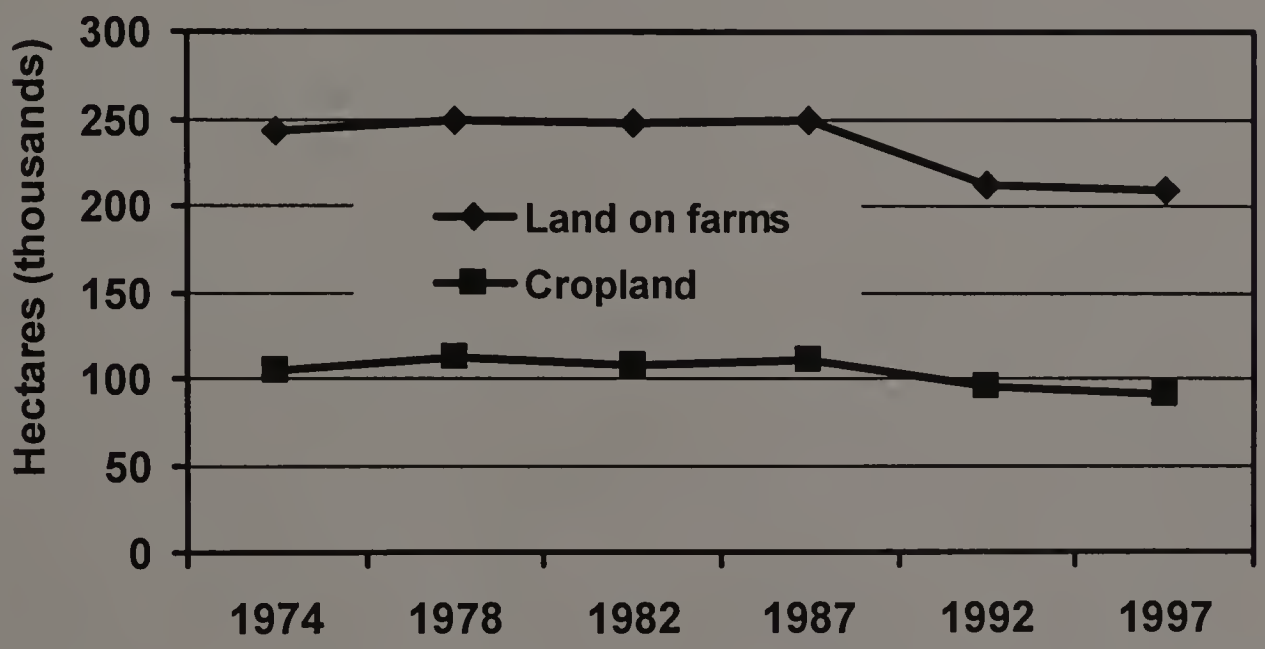

Figure 2.10. Land on farms and cropland in Massachusetts, 1974-1999. Source of data: U.S. Census of Agriculture.

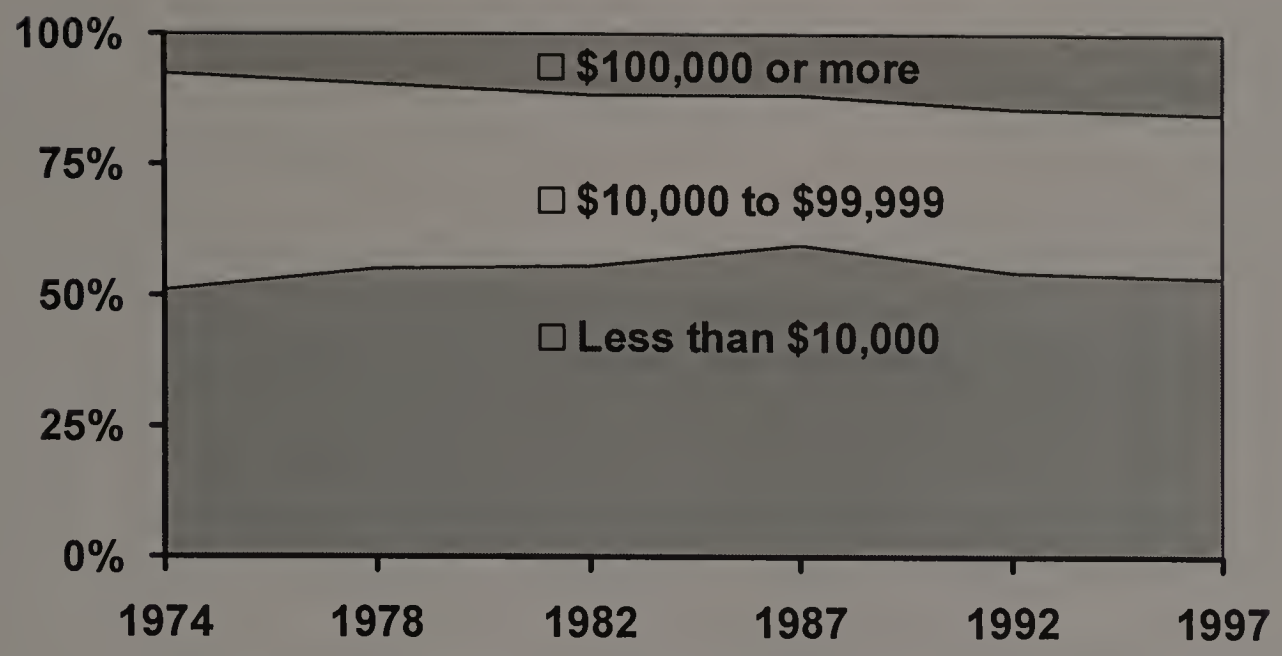

Figure 2.11. Distribution of Massachusetts farms by amount of sales, 1974-1997. Source of data: U.S. Census of Agriculture.

In 1997, 80 percent of Massachusetts farms were operated as sole proprietorships, and another 8 percent were managed as private partnerships. Only 10 percent were operated as corporations; of these, 9 out of 10 were family-held corporations with 10 or fewer stockholders. Fewer than 2 percent of farms were held by other business structures, such as cooperatives, estates or trusts, or institutions. These values changed little from 1978, when 83 percent of farms were sole proprietorships, 9 percent were private partnerships, 7 percent were corporations, and 1 percent was owned by other business structures (Table 2.5).

Table 2.5. Number of farms by legal structure of business organization, Massachusetts, 1978 and 1997.

	1978	1997
Individual or family (sole proprietorship)	4,087	4,496
Partnership	439	443
Corporation	358	554
Other - cooperative, estate or trust, institutional, etc.	62	81

Source: US Census of Agriculture, 1978 and 1997.

Farmer Demographics

In addition to changes in the number of farms, farm size, amount of sales, and crop mix, there were changes in the demographics of the farmers themselves. In 1997, the farming population of Massachusetts consisted of a higher percentage of part-time farmers than in previous years. The percentage of farm operators for whom farming was not a primary occupation increased from 39 percent in 1974 to 47 percent in 1997. The strong Massachusetts economy enabled farmers to find supplementary employment off the farm. As a result, the profile of Massachusetts farmers became diversified, comprising both full-time and part-time farmers.

From 1974 to 1977, farmers changed their hiring practices of farm laborers. Farmer employers paid 82 million dollars to hired farm workers, achieving 455 million dollars in sales in 1997. The resulting 18 percent of gross revenue was unchanged from 1974, when farmers paid 32 million for farm labor, achieving 180 million in sales. In 1997, however, farmers found themselves depending on fewer numbers of hired workers (Table 2.3). With a pool of seasonal workers harder to come by, farmers were hiring employees on a longer term basis. The number of employees working fewer than 150 days per year decreased, while the number working more than 150 days increased. This trend, of relying on fewer farm employees hired on a longer term basis instead of greater numbers of workers hired for the short term, held true in all counties.

From 1974 to 1997, there were changes in the age of farmers. The farming population was aging, with fewer young people were entering the field. As of 1997, the average age of farmers in Massachusetts, 54.9 years old, was at an all-time high (Figure 2.12). This state trend followed the national trend of increased average age from 52 years in 1987 to 54.3 years in 1997. Only a scant 5 percent of the Massachusetts farmer population was under the age of 35, as compared to 11 percent in 1978; 47 percent was over the age of 55, as compared to 45 percent in 1978.

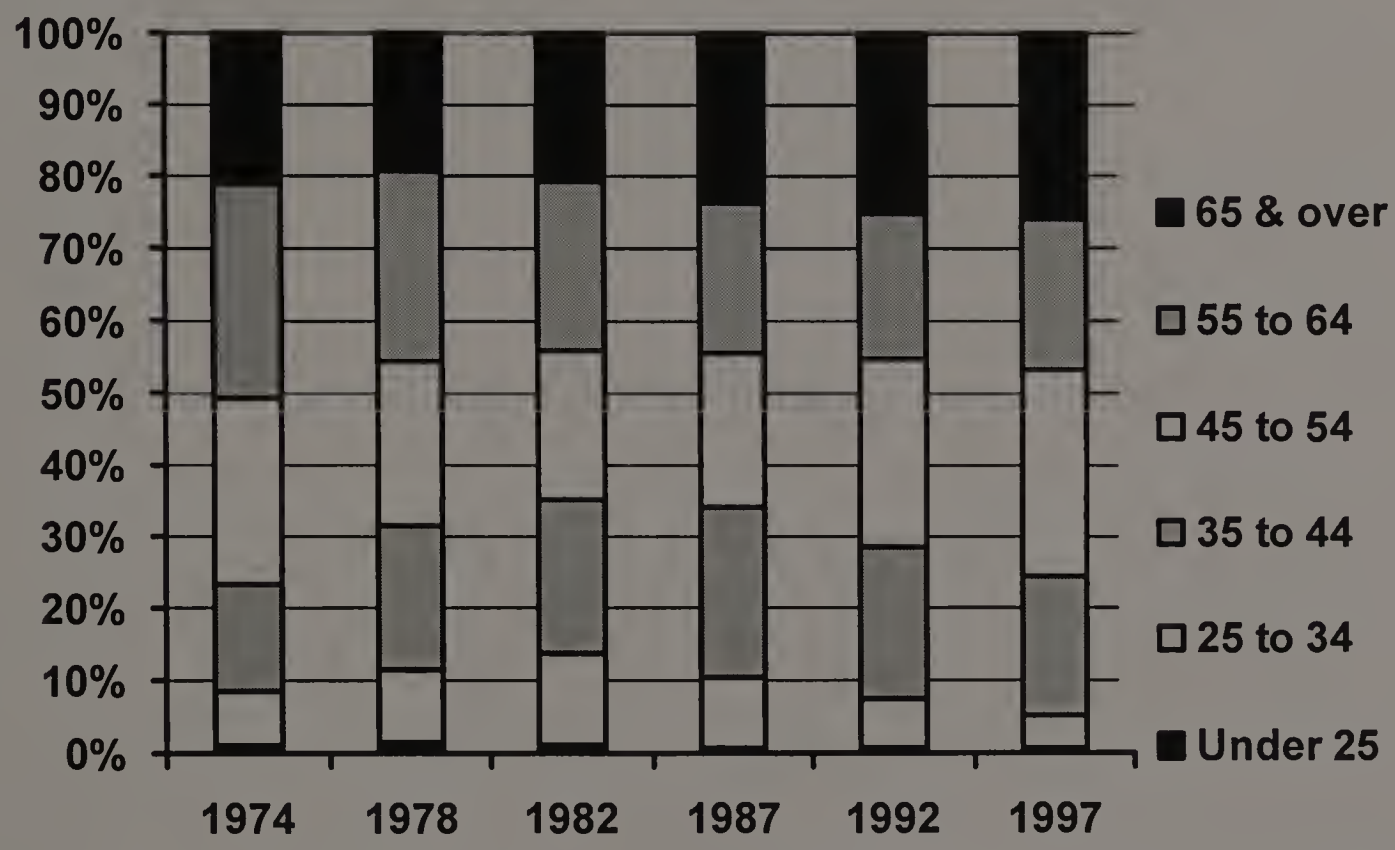

Figure 2.12. Distribution of Massachusetts farmers by age group, 1974-1997. Source of data: U.S. Census of Agriculture

The shrinking pool of young people entering the field was exasperated by the fact that the average per farm investment in land, buildings, machinery, and

equipment in Massachusetts approached one-half million dollars in 1997, making it difficult for new farmer entry (Figure 2.13).

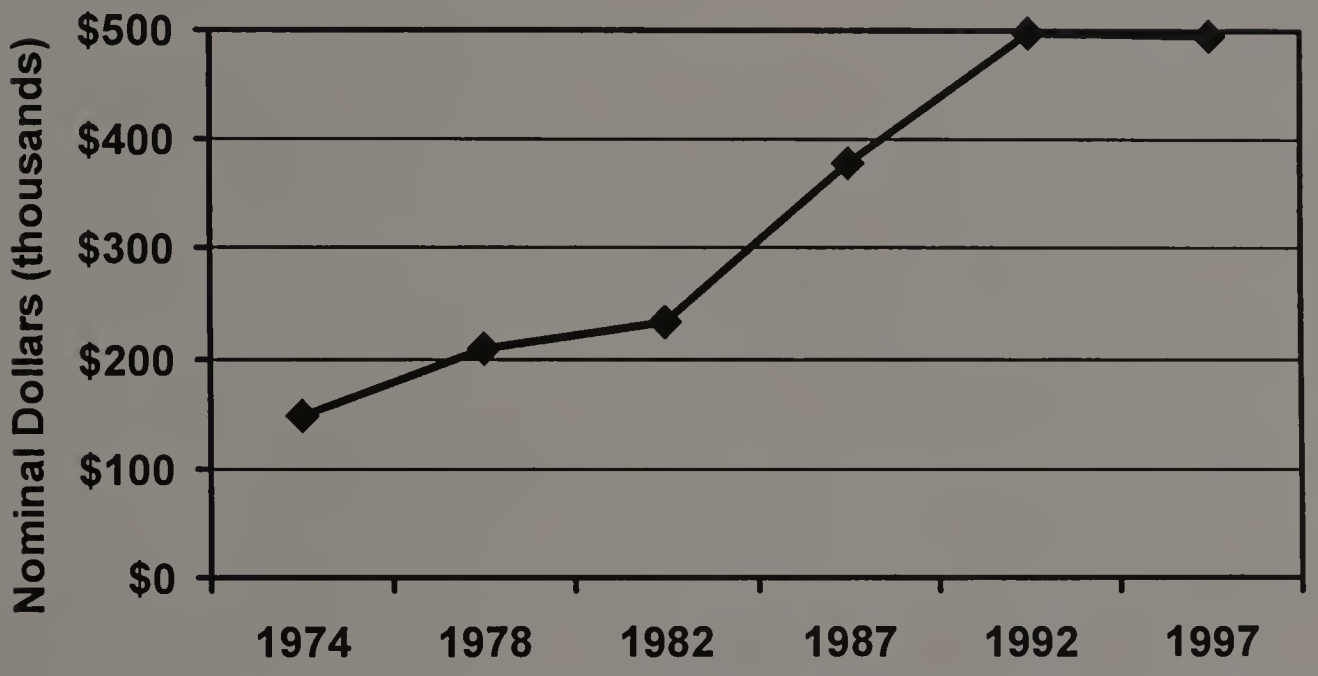

Figure 2.13. Average investment in land, buildings, machinery, and equipment, Massachusetts farms, 1974-1997.
Source of data: U.S. Census of Agriculture

In 1997, the estimated market value of all farmland and buildings averaged $12,866 per hectare in Massachusetts, with an average per farm investment of $455,014. This was a dramatic nominal dollar increase from 1974, when average farmstead value was just $2,375 per hectare and $128,535 per farm. However, the farm value increase was small in real dollar terms using the Consumer Price Index to convert to 1984 dollar equivalents, rising from $260,720 per farm in 1974 to $283,498 in 1997, a 9 percent increase. The average investment in machinery and equipment was $40,395 per farm in 1997, doubled from $19,729 in 1974; but in dollars adjusted by the Consumer Price Index, this was a real decrease of 18 percent. Yet, with rates of return in agriculture

remaining low, this represents a substantial investment and risk for new farmers. The phenomenon of an aging farmer population of farmers could result in a surge of future retirements and subsequent farm closings unless sufficient numbers of new farmers would not only become attracted to farming but also find it to be a viable occupation.

While the gender profile of Massachusetts farmers changed somewhat, the racial profile primarily remained the same. The number of female farm operators and the total amount of farmland they managed increased. In 1978, there were 453 women farmers managing 14,204 hectares; by 1997 there were 926 women managing 19,172 hectares. The number of farms operated by non-white minorities remained small. In 1997, 36 farms comprising 530 hectares were operated by non-white minorities, while in 1978, 33 farms comprising 789 hectares were operated by this segment of the farm population. Similarly, for the nation as a whole, there was only a slight increase in the number of non-white minority farmers, from 44,640 in 1987 to 47,658 in 1997.

Regional Overview

The locations of the fourteen counties of Massachusetts are depicted in Figure 2.14, along with respective shares of the state's farms and farm product sales. Each of the state's three main areas; the eastern, central, and western areas; has distinctive advantages. In the southeast are Dukes County,

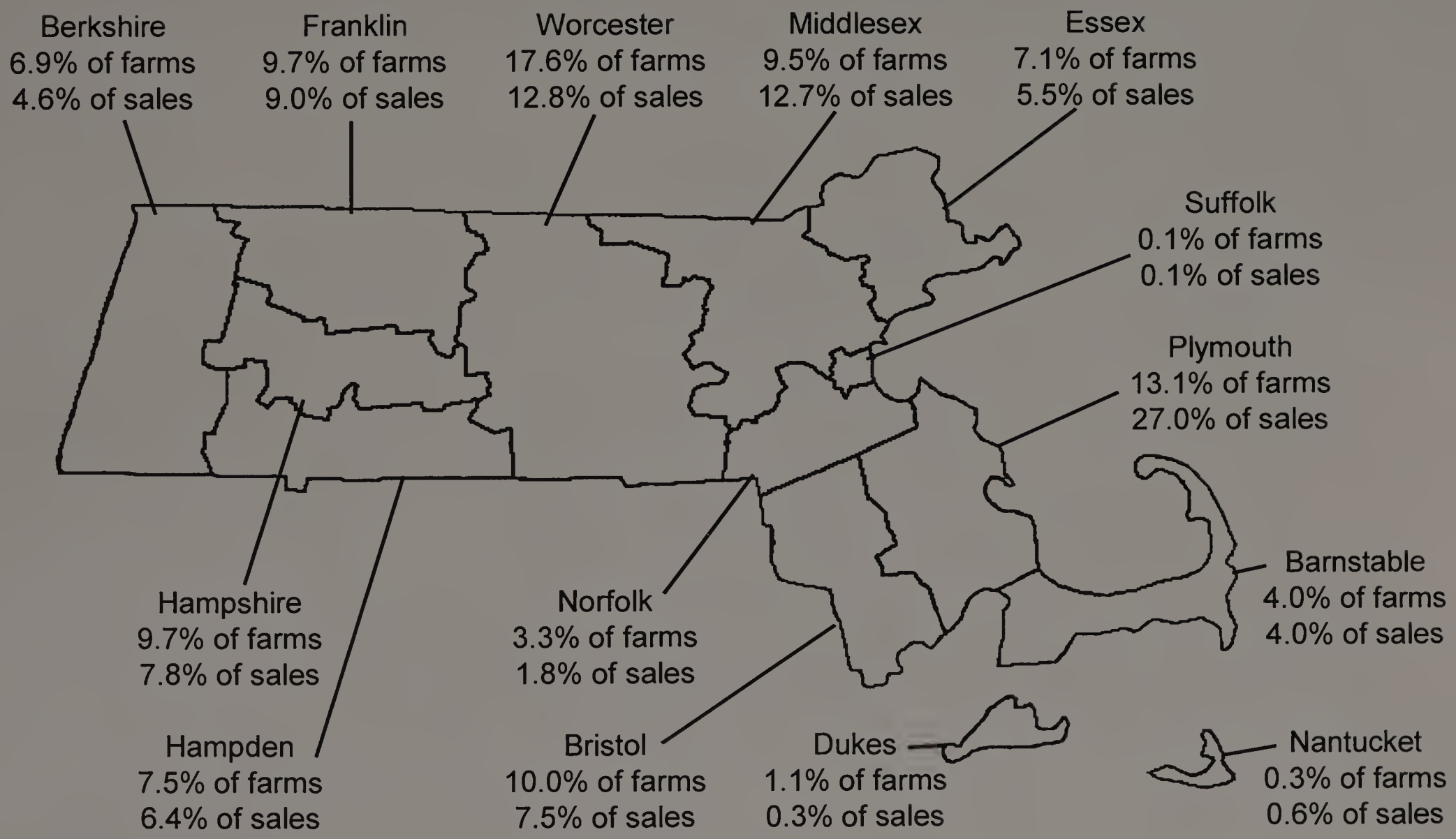

Figure 2.14. Counties of Massachusetts with their share of the state's farms and farm product sales, 1997. Source of data: U.S. Census of Agriculture.

comprising the island of Martha's Vineyard; Nantucket County covering the island of Nantucket; and Barnstable County encompassing Cape Cod, which is a peninsula surrounded by the Atlantic Ocean. These counties and the other eastern coastal counties; from the south to the north: Bristol, Plymouth, Norfolk, Suffolk, Middlesex, and Essex; have more favorable temperate climates due to their proximity to the ocean. The growing population and industry of the greater Boston metropolitan area provided a strong market for agricultural products in these eastern counties. Although lacking the beneficial tempering effect of the ocean, pastoral, hilly Worcester County is close to the greater metropolitan area of Boston and farmers residing there could take advantage of the better market opportunities. In the western part of the state stretching toward the west to the Berkshire Mountains, the counties of Franklin, Hampshire and Hampden benefited from the fertile basin soils of the Connecticut River Valley, bisected from the north to the south by the Connecticut River. On the western border of Massachusetts, the most rural county, semi-mountainous Berkshire County, with its characteristic woodlands, steams, and riverbeds, offered farmers the advantage of lower land prices.

The land base of each county is given in Table 2.6, including the total land area for each county and the state; the percentage of the state's land, farmland, and cropland located within each county; the percentage of each county's land that is in farmland and in cropland; and the percentage of each county's cropland that is irrigated. Worcester County has the most land, 19.3 percent of the state

total. It also has the most farmland, 19.9 percent of the state total, and cropland, 19.7 percent. Plymouth County has the largest proportion of its land in farmland, 17.4 percent, and Hampshire County has the largest proportion of its land in cropland, 7.9 percent of its land. Barnstable and Plymouth Counties are the counties that have the largest proportions of their cropland irrigated.

Table 2.6. Land base of Massachusetts and its counties, 1997.

	All land (hectares)	County's land as a percentage of state: All land	Farm-land	Crop-land	Percentage of land in: Farm-land	Crop-land	Percentage of cropland that is irrigated
Barnstable	102,505	5.0	0.9	1.1	1.9	1.0	73.2
Berkshire	241,234	11.9	12.1	13.8	10.5	5.2	0.4
Bristol	144,018	7.1	7.2	7.9	10.4	4.9	11.2
Dukes	26,890	1.3	0.9	0.6	7.4	2.1	6.9
Essex	129,004	6.4	4.9	5.6	8.0	3.9	9.9
Franklin	181,861	9.0	14.5	14.2	16.7	7.1	5.8
Hampden	160,201	7.9	7.2	7.2	9.5	4.1	6.8
Hampshire	137,023	6.7	10.1	12.0	15.4	7.9	2.6
Middlesex	213,305	10.5	5.9	6.8	5.8	2.9	10.4
Nantucket	12,376	0.6	0.2	(D)	3.4	(D)	(D)
Norfolk	103,500	5.1	1.9	1.7	3.9	1.5	8.6
Plymouth	171,097	8.4	14.2	9.3	17.4	4.9	58.9
Suffolk	15,157	0.7	0.0	(D)	0.0	(D)	(D)
Worcester	391,921	19.3	19.9	19.7	10.7	4.5	2.9
State total	2,030,093				10.3	4.4	11.0

(D) = Data withheld to avoid disclosure of individual farms.
Source of data for calculations: 1997 Census of Agriculture, USDA.

Generally, farmers in the Greater Boston region survived in the urban environment by taking advantage of specialized consumer markets, especially for nursery and greenhouse products and direct marketed vegetable crops. To the

south and west, farmers operated more traditional wholesale enterprises such as vegetable farms, orchards, and dairy farms. Most sales from Massachusetts farms were from crops, over three times the sales of livestock and livestock products (Figure 2.15). The top crop product group was fruits, nuts, and berries, which increased in importance since 1978 (Figure 2.16; Figure 2.17).

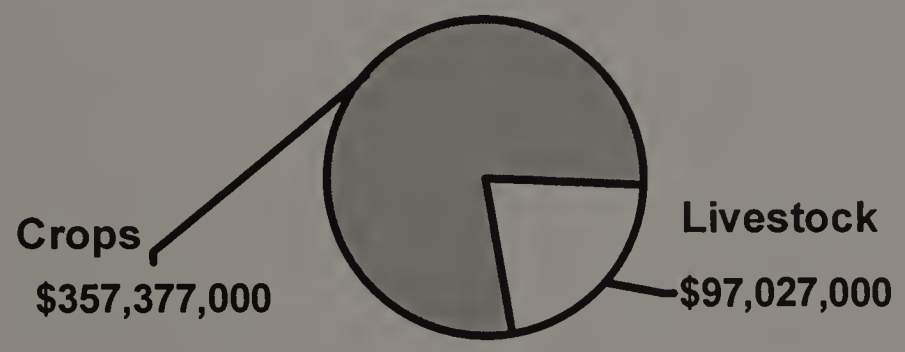

Figure 2.15. Proportion of crops to livestock sales in Massachusetts, 1997.
Source of data: U.S. Census of Agriculture.

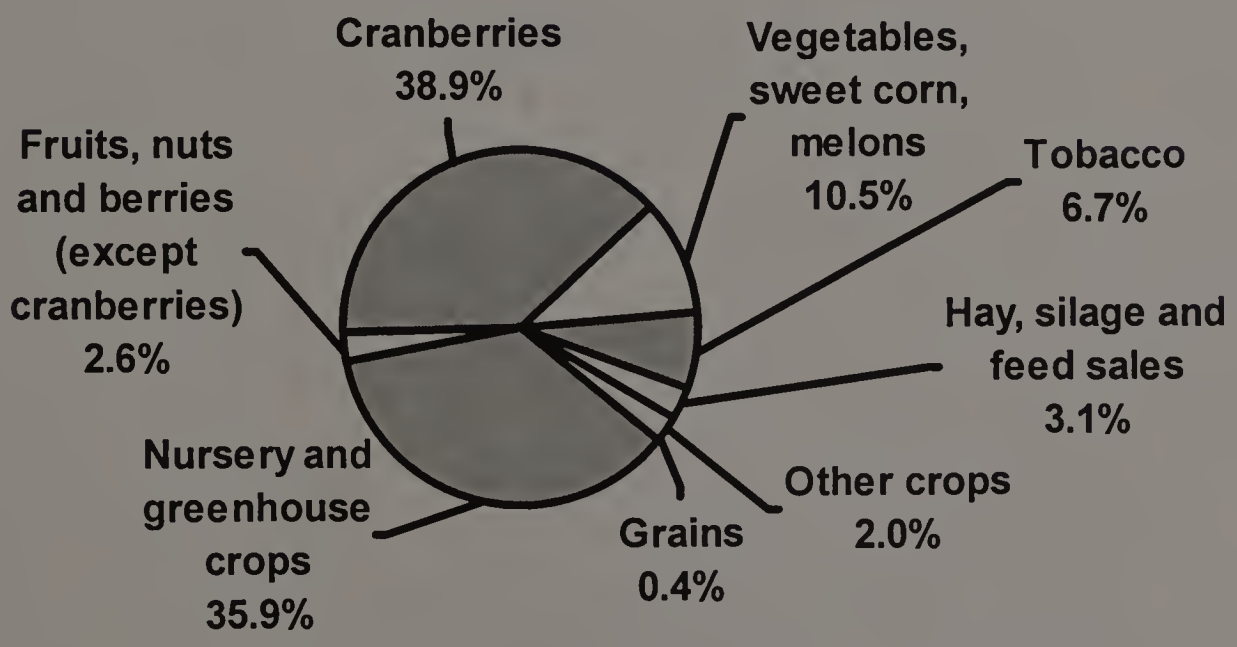

Figure 2.16. Relative proportions of crop sales in Massachusetts, 1997.
Source of data: U.S. Census of Agriculture.

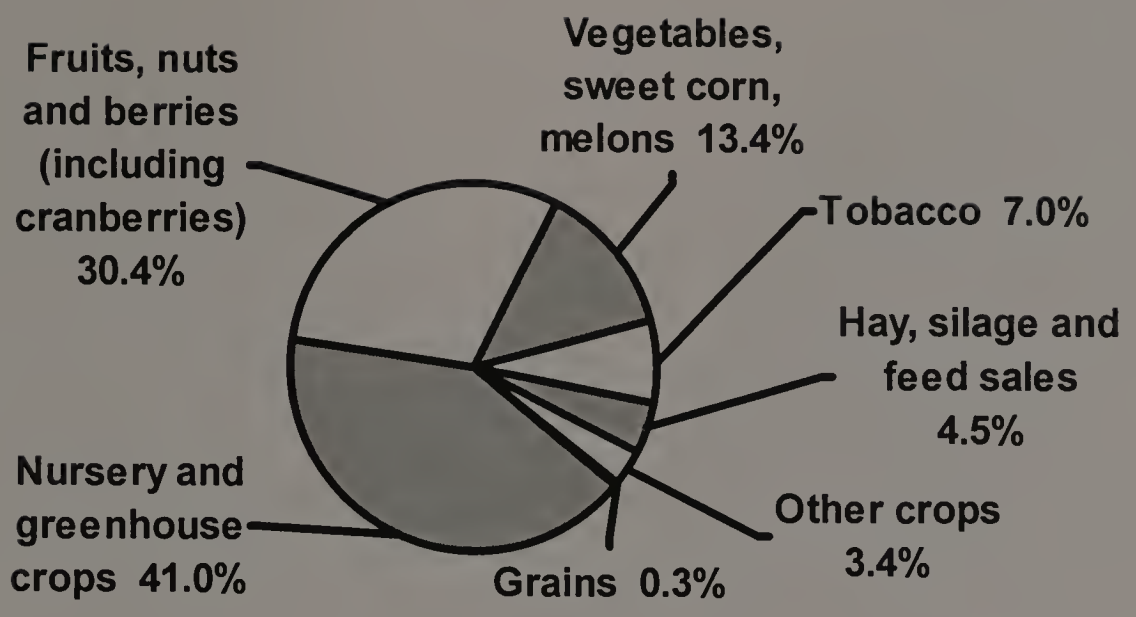

Figure 2.17. Relative proportions of crop sales in Massachusetts, 1978. Source of data: U.S. Census of Agriculture.

The best- performing segment of Massachusetts agriculture, cranberry production, ranked first among cash receipts. Land in cranberry production increased 50 percent (Figure 2.18), and yields of cranberries nearly doubled since 1978 (Figure 2.19).

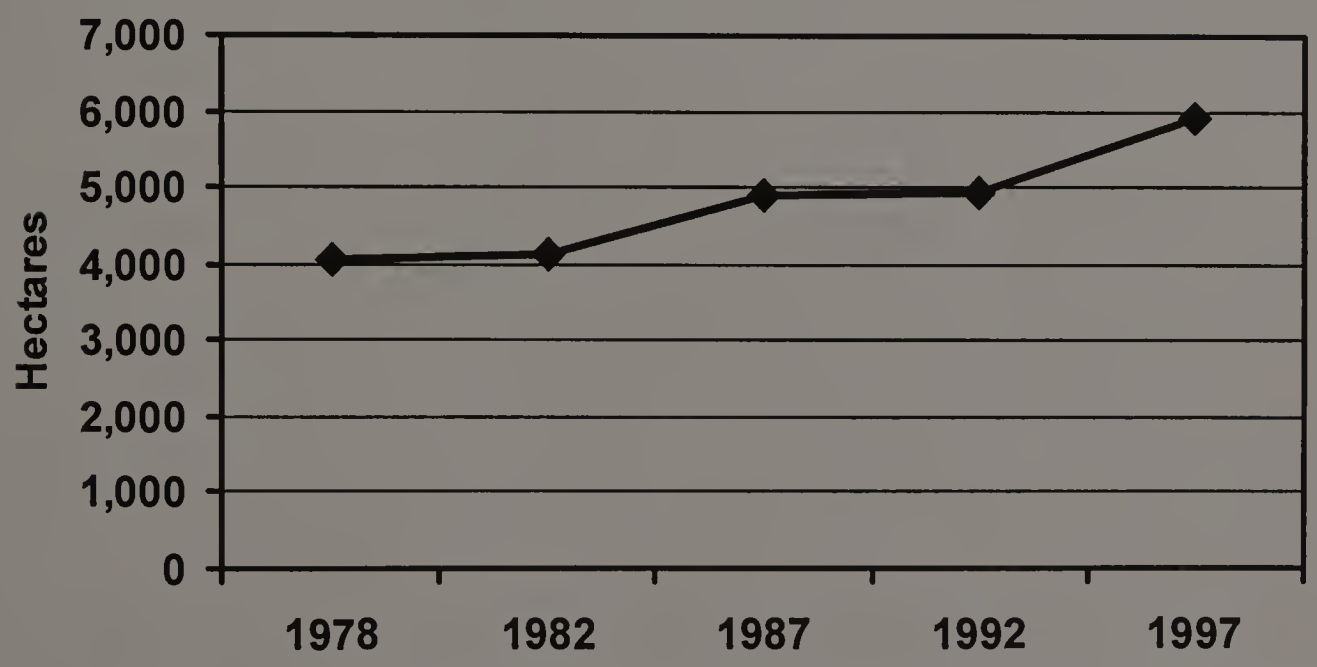

Figure 2.18. Land in cranberry production in Massachusetts, 1978-1997. Source of data: U.S. Census of Agriculture.

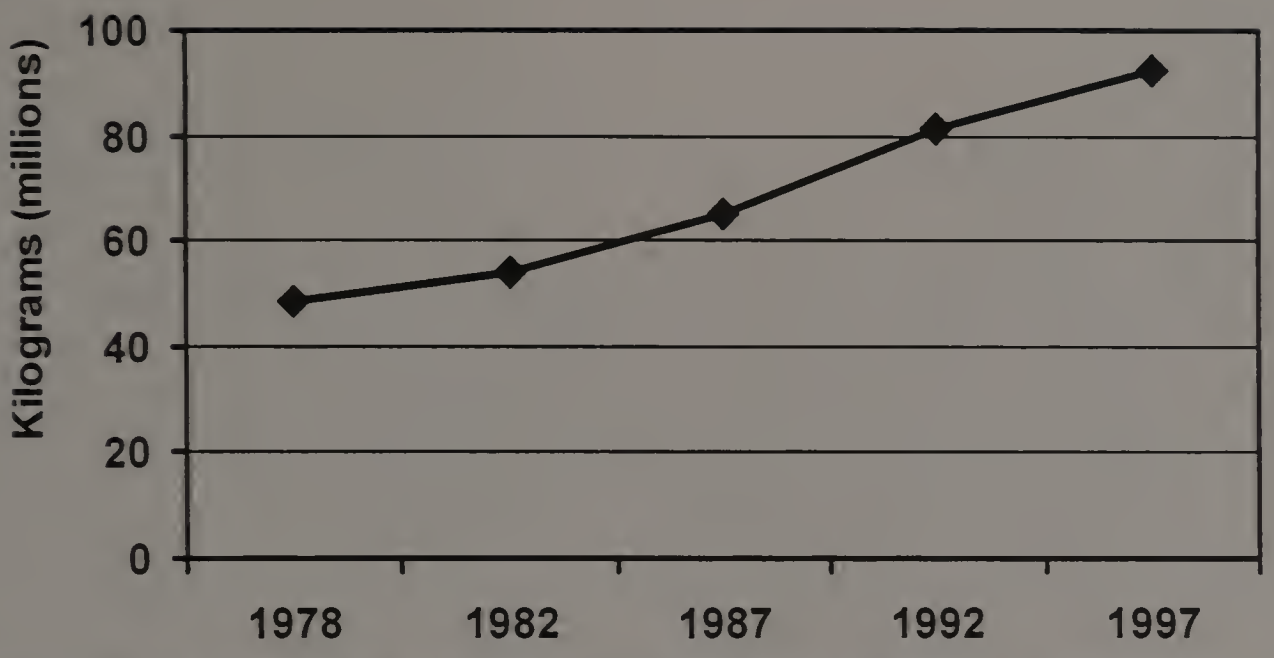

Figure 2.19. Total yield of cranberries in Massachusetts, 1978-1997. Source of data: U.S. Census of Agriculture.

Plymouth County produced the majority of the state's cranberry crop, 85 percent in 1997, followed by Barnstable County, with 9.8 percent. Combined, these two counties and Bristol County, also in the southeastern part of the state, produced 99 percent of the cranberry crop for Massachusetts.

Fruit production in the central and western regions was dominated by apples, the fourth largest crop in the state. Although the number of farms with orchards (Figure 2.20) and land in orchards declined (Figure 2.21), apple sales in Massachusetts accounted for 29.3 percent of New England's total apple sales. Apples dominated Worcester County's $7.1 million in fruit sales. Worcester County produced 47 percent of the state's apples, while Middlesex, Franklin, and Hampden Counties produced between 11 percent and 13 percent each. Combined, these four counties contributed the majority of the Massachusetts apple crop, 85 percent, in 1997. Of these large apple producing counties, only

Middlesex County was contiguous to metropolitan Boston, on the east coast; the other counties were in the central and western parts of the state.

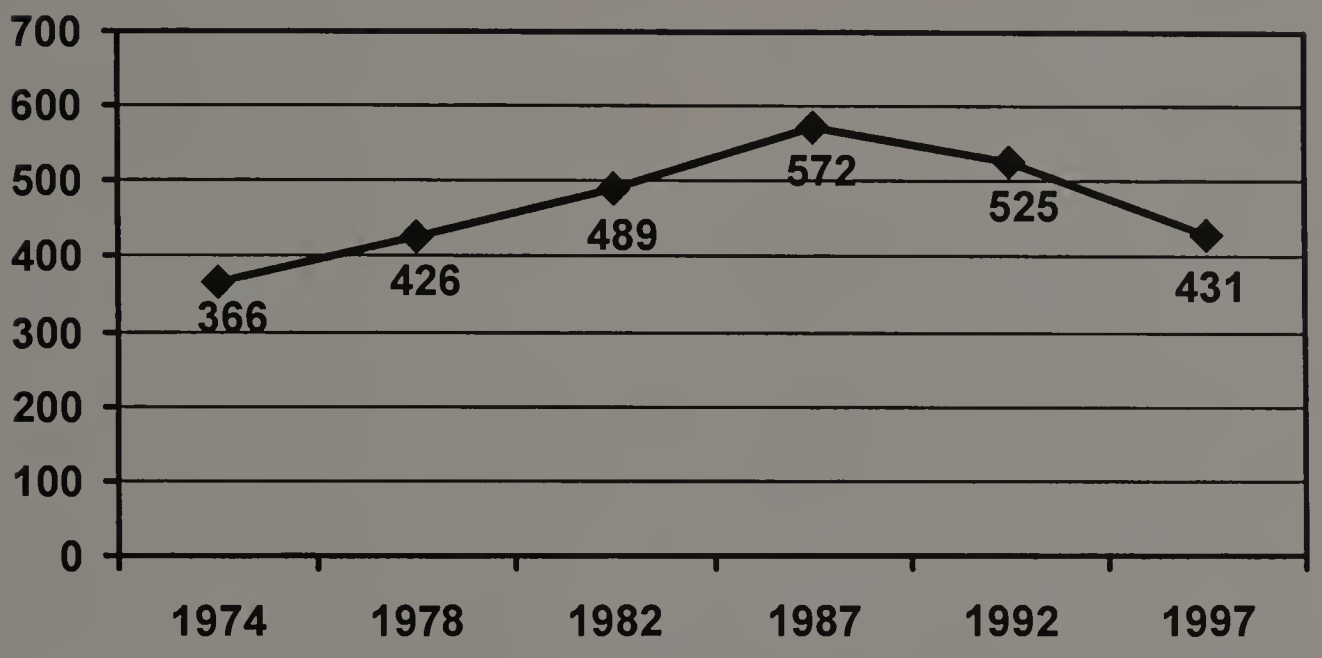

Figure 2.20. Number of farms with orchards, Massachusetts 1974-1997.
Source of data: U.S. Census of Agriculture.

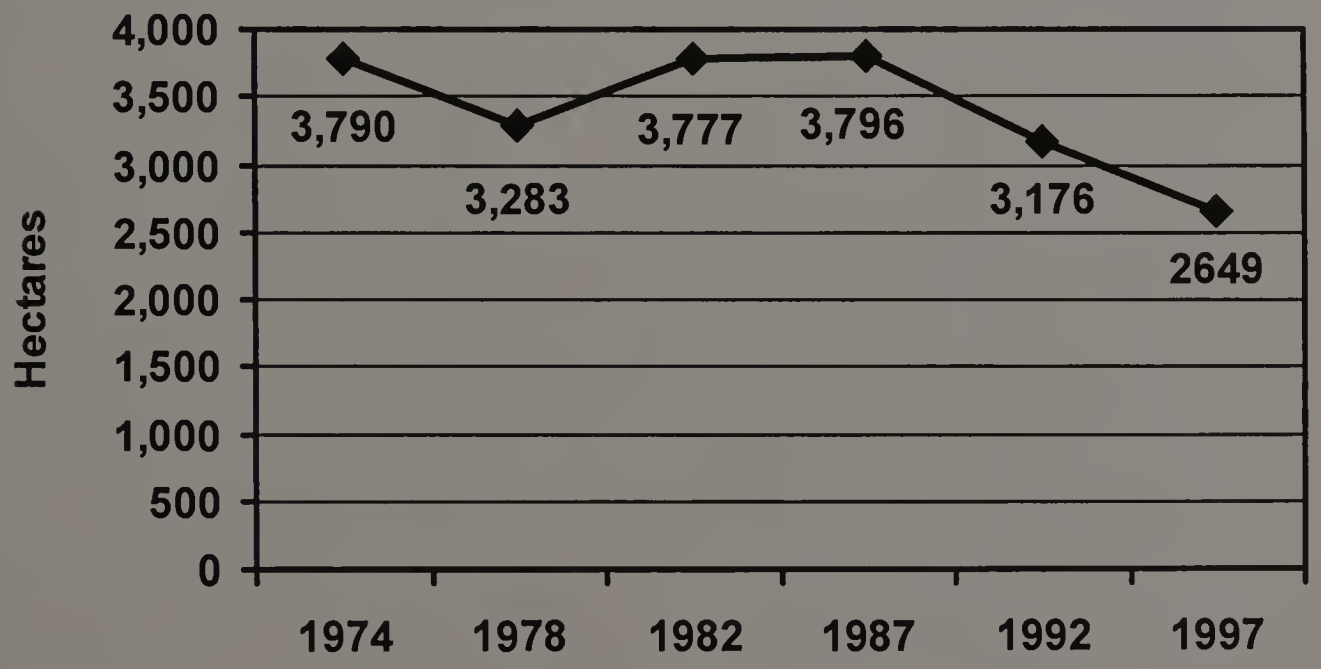

Figure 2.21. Land in orchards, Massachusetts 1974-1997.
Source of data: U.S. Census of Agriculture.

The second highest agricultural group was nursery and greenhouse production, a blossoming sector of Massachusetts agriculture (Figure 2.22). Much of the growth in the nursery and greenhouse group was attributable to the landscaping industry, whose growth was enhanced by increased consumer demand during the state's long-running construction boom. Sales increased by 58 percent from 1987, with nearly 46 percent occurring after 1992. Middlesex County was the leading county in nursery and greenhouse production, with $41.3 million in sales, comprising nearly one-third of the Commonwealth's total in this category. Worcester and Essex Counties followed with 13.5 percent and 11.2 percent of the state's total, respectively. Growth in the sector of nursery and greenhouse was impressive throughout the state, with most counties showing increases in sales of more than 40 percent. In Berkshire County, sales more than doubled, reaching $4.8 million.

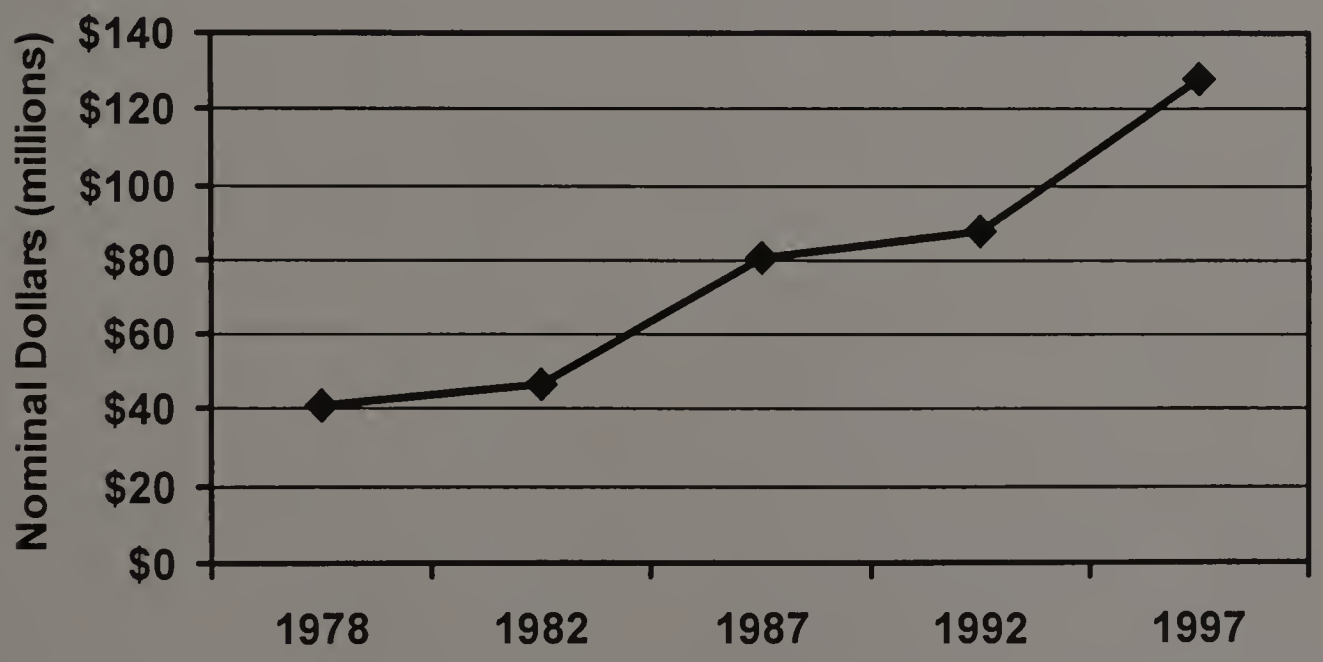

Figure 2.22. Sales of nursery and greenhouse crops from Massachusetts farms, 1978-1997. Source of data: U.S. Census of Agriculture.

While dairy sales remained fairly stable from 1987 to 1997 (Figure 2.23), there was a significant decrease in the number of dairy farms, which fell from 609 in 1987 to 353 in 1997 (Figure 2.24). The losses were greatest in Worcester County, where there was a 30 percent reduction in the number of dairy farms. Additionally, Franklin and Berkshire Counties each lost 20 percent.

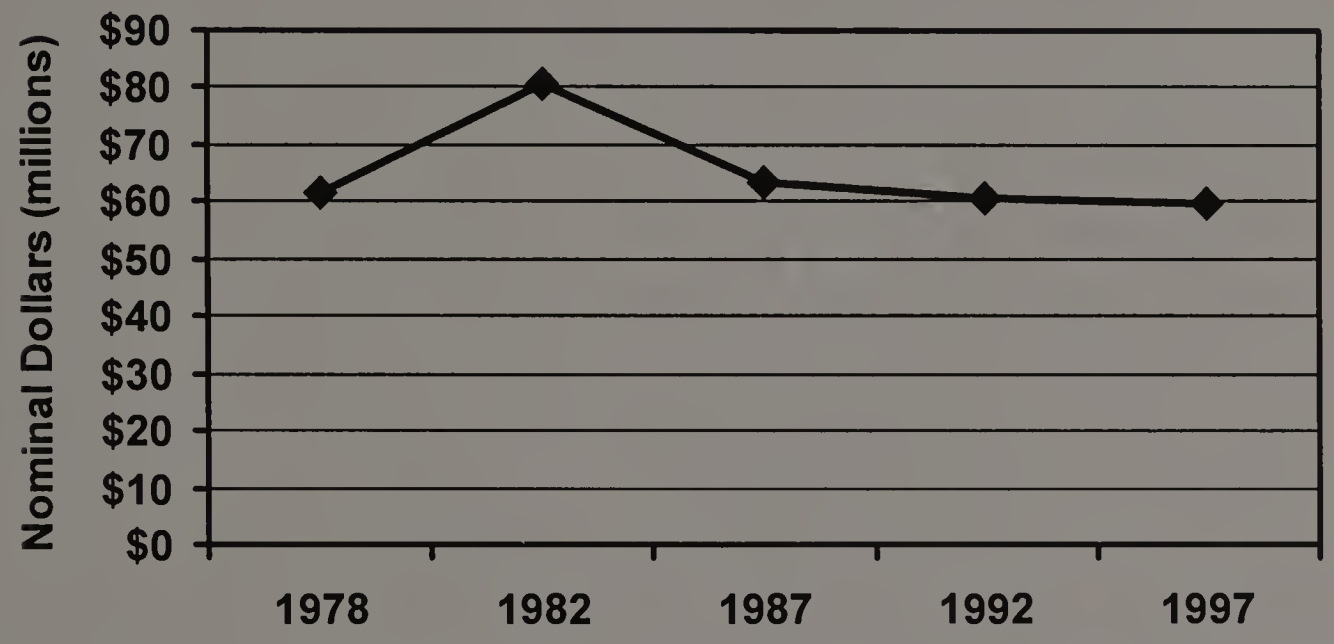

Figure 2.23. Dairy product sales from Massachusetts farms, 1978-1997. Source of data: U.S. Census of Agriculture.

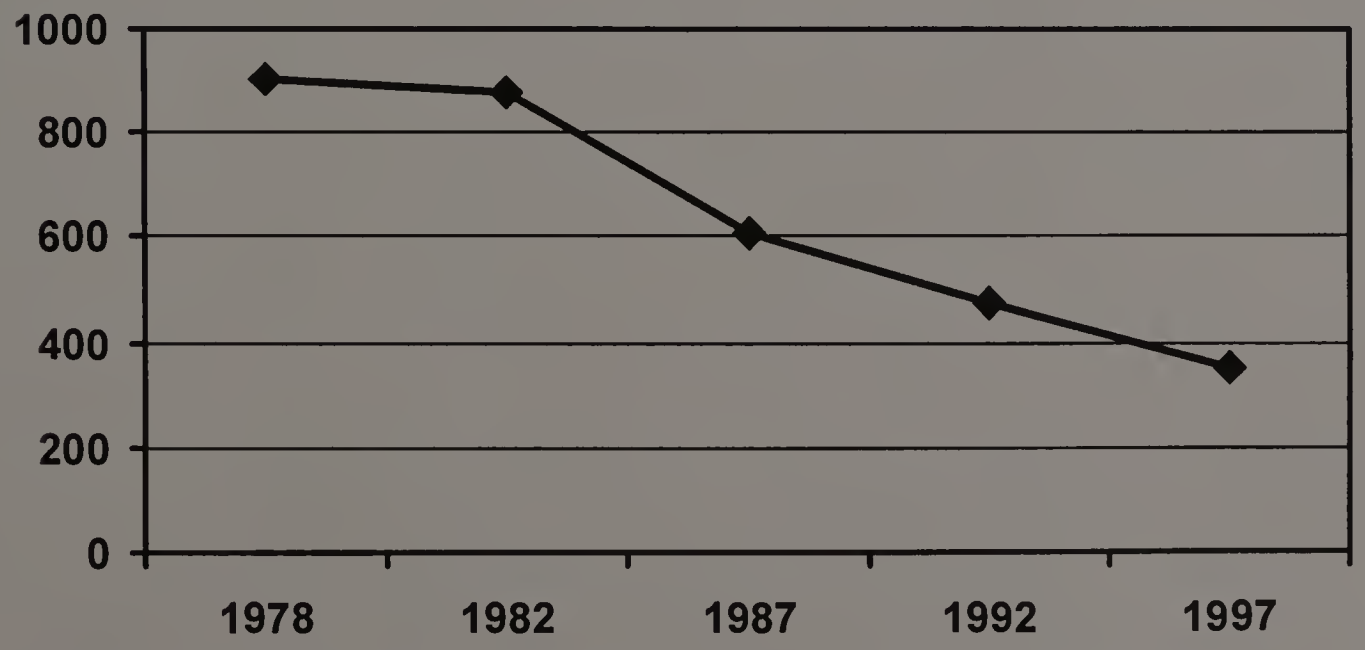

Figure 2.24. Number of dairy farms in Massachusetts, 1978-1997. Source of data: U.S. Census of Agriculture.

Despite the number of farms going out of dairy production, dairy products ranked as the third highest agricultural product group in Massachusetts, with 10 percent of the New England total in 1997. It remained the largest segment of livestock sales (Figure 2.25). Worcester County led the state in dairy production with $12.9 million of the state's $59.8 million total. Franklin County followed closely with $12.2 million, and Berkshire County contributed $9.6 million. Combined, these three counties accounted for 58 percent of the state's total dairy sales.

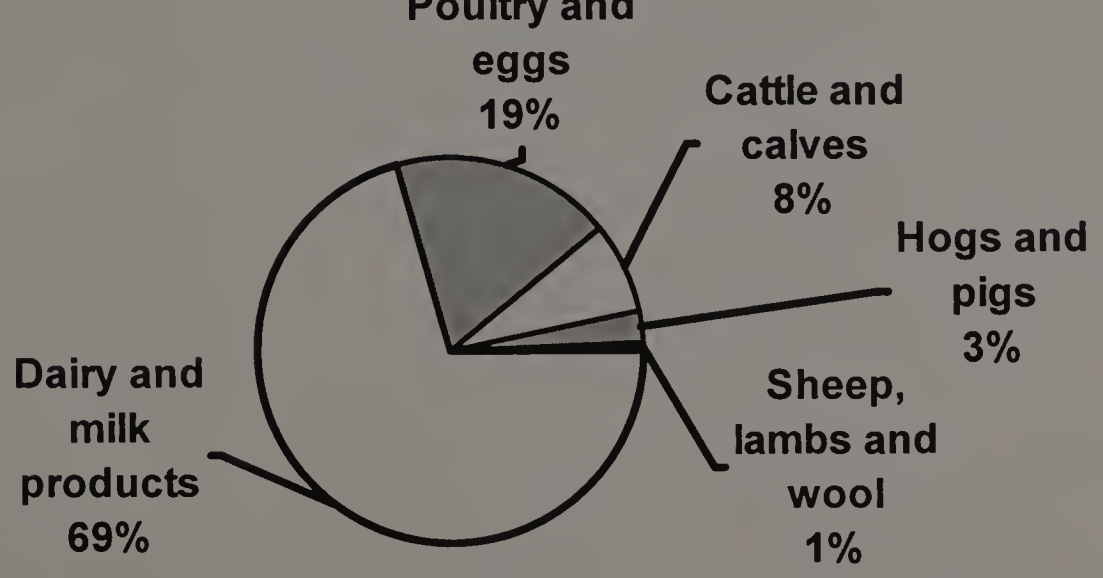

Figure 2.25. Relative proportion of livestock sales in Massachusetts, 1997. Source of data: U.S. Census of Agriculture.

The fourth highest product group in Massachusetts was vegetables, sweet corn, and melons and the fifth product group was tobacco. Vegetable sales rose significantly in Massachusetts (Figure 2.26). Bristol, Hampshire, and Middlesex Counties were first, second, and third in vegetable production, respectively,

together producing 47 percent of the state's total. Combined, Worcester and Franklin Counties produced an additional 23 percent of the state's vegetables, sweet corn and melons.

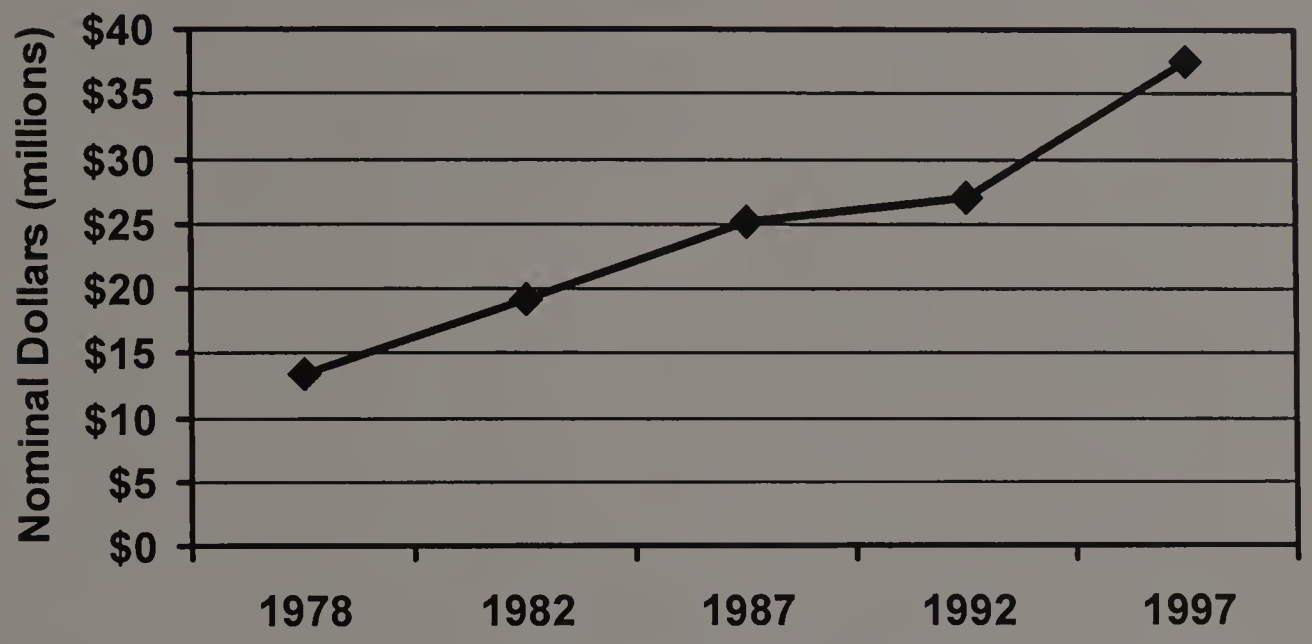

Figure 2.26. Vegetable sales from Massachusetts farms, 1978-1997. Source of data: U.S. Census of Agriculture.

Some of the greatest increases in farm income in Massachusetts were on tobacco farms. Total sales of tobacco skyrocketed from $4.6 million in 1987 to $24 million in 1997 (Figure 2.27). The amount of land allocated to tobacco crops increased steadily after 1982, increasing from 142 hectares to 476 hectares in 1997. Due to the existence of ample production capacity, provided by infrastructure and equipment such as tobacco curing barns, small tractors, and racking trailers, farmers were able to respond quickly to improved market conditions for tobacco, a high-value-per-hectare specialty crop. Tobacco production was concentrated in the Connecticut River Valley, where Hampshire and Franklin Counties produced 56 percent of the state's tobacco crops in 1997.

The remainder of the Commonwealth's total tobacco production was most likely produced in Hampden County, although the exact percentage is not available due to county level Census disclosure problems.

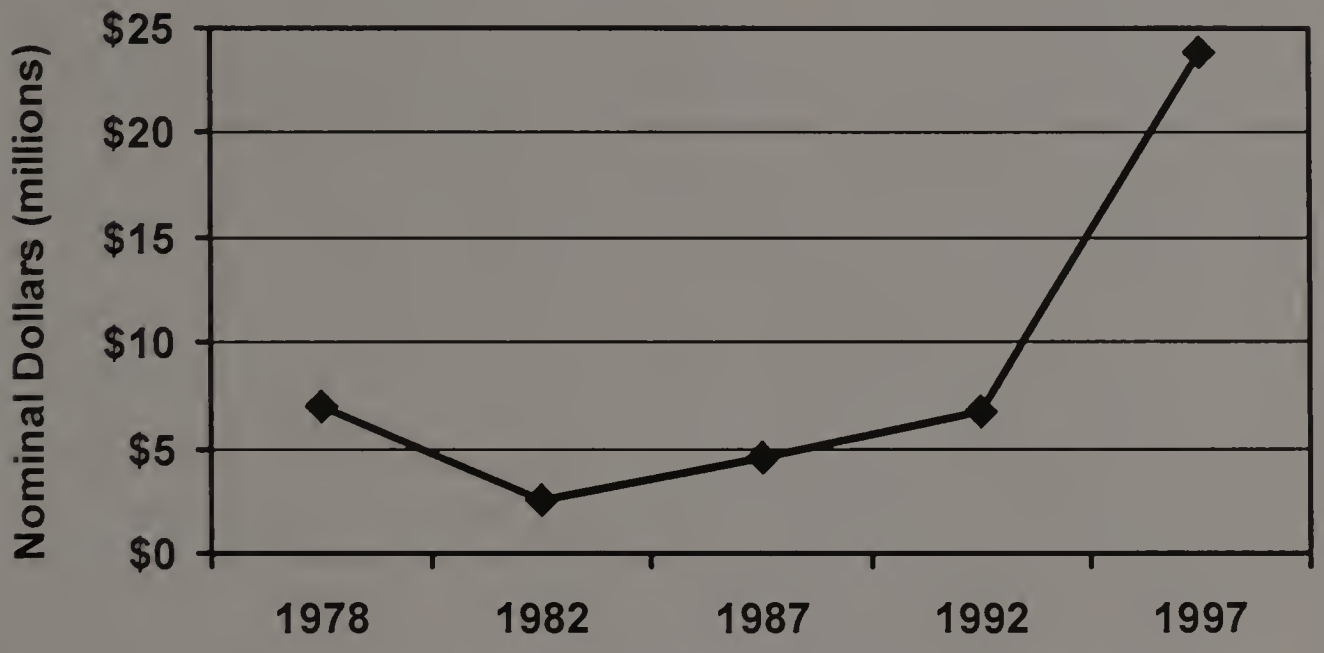

Figure 2.27. Tobacco sales from Massachusetts farms, 1978-1997.
Source of data: U.S. Census of Agriculture.

Massachusetts Counties and their Varied Agricultural Products

Every county within Massachusetts experienced an increase in the number of farms from 1974 to 1997. As depicted in Figure 2.28, the greatest increases occurred in the counties with the most farms in 1974: Franklin, Plymouth, and Worcester. In addition, agricultural sales increased in every county as well (Figure 2.29.). The most dramatic increase took place in Plymouth County, reflecting the success of the cranberry industry in that county over the 1974 to 1997 period.

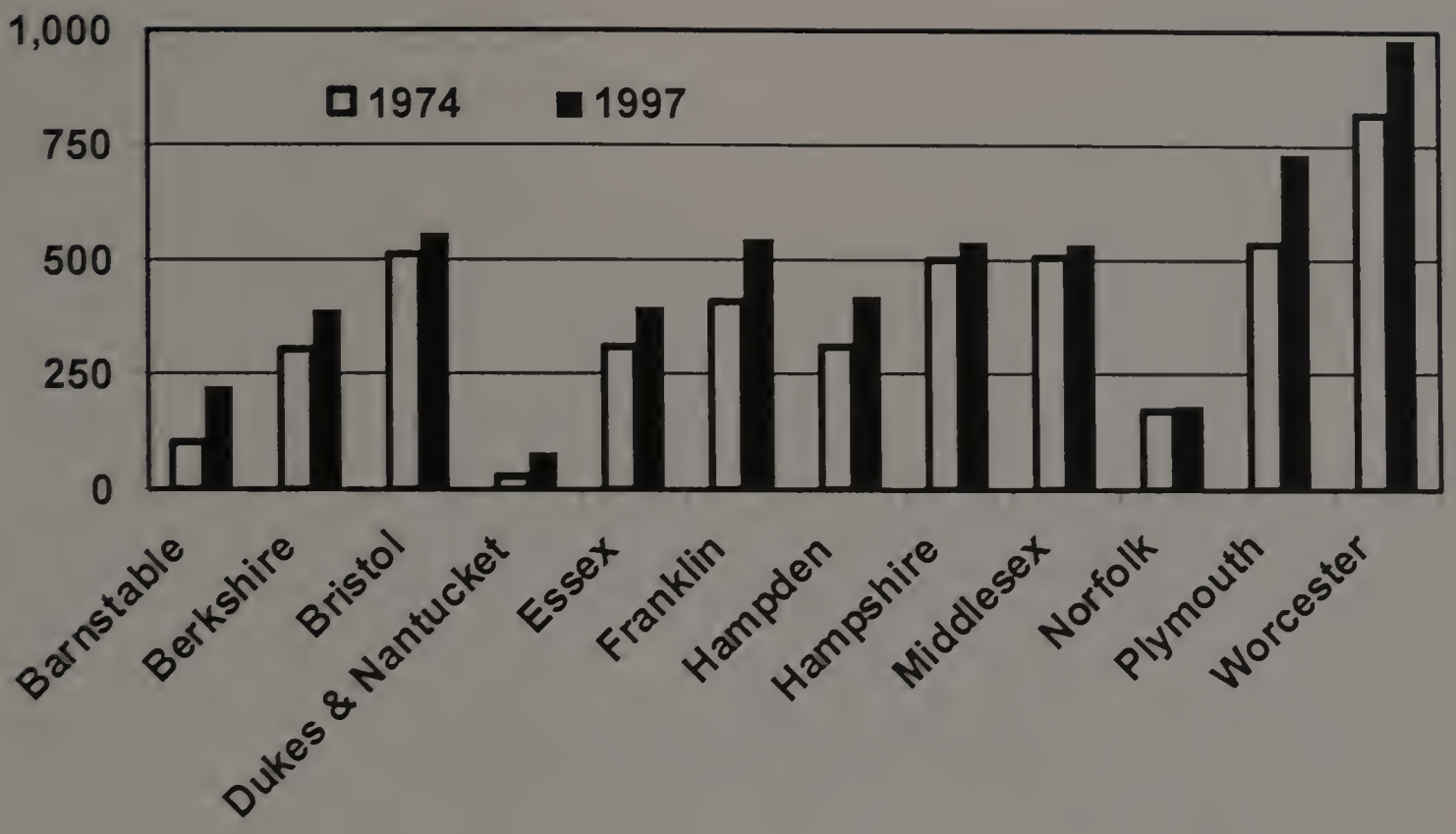

Figure 2.28. Number of farms in Massachusetts counties, 1974 and 1997. Source of data: U.S. Census of Agriculture.

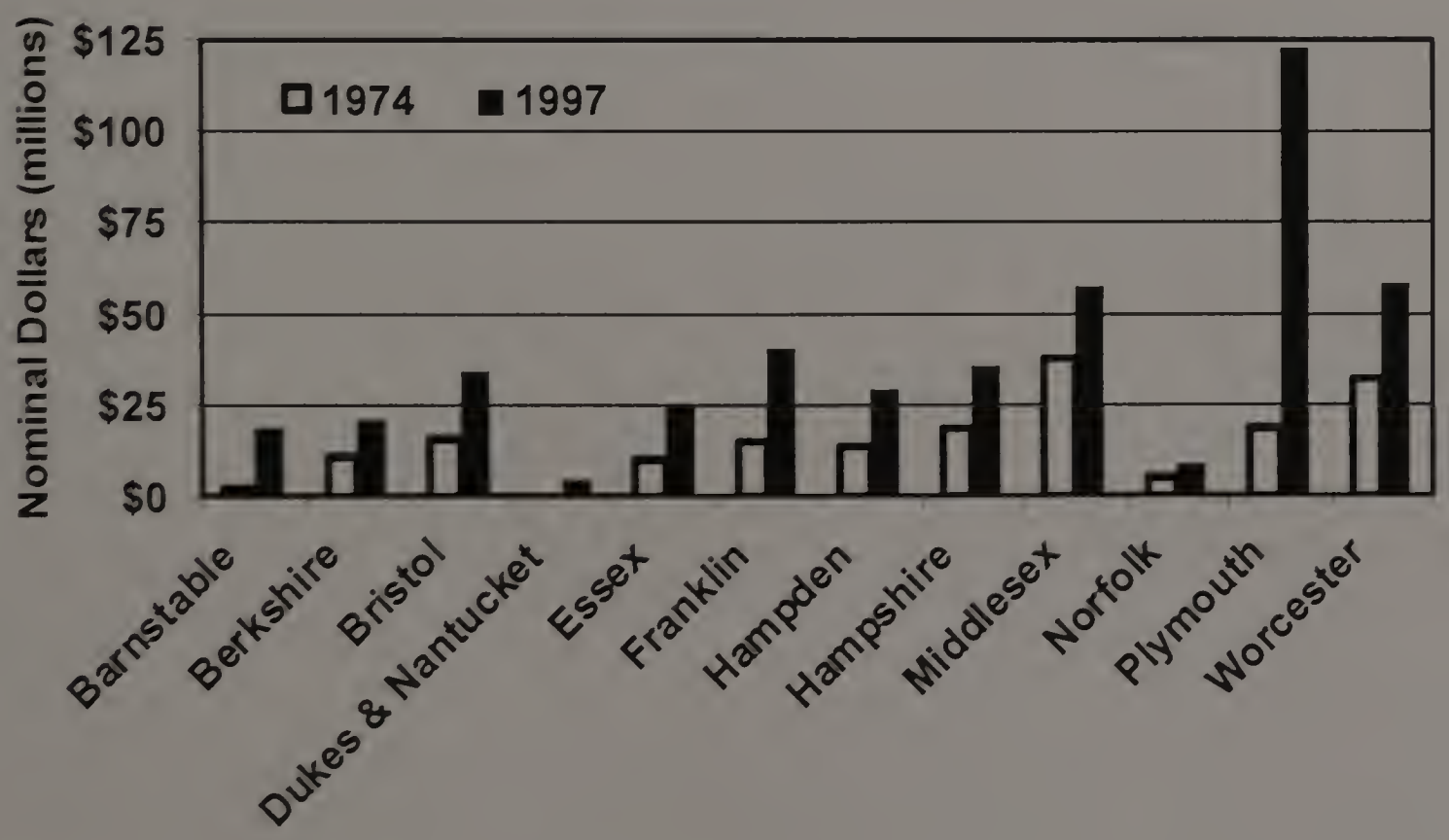

Figure 2.29. Sales of farm products from Massachusetts counties, 1974 and 1997. Source of data: U.S. Census of Agriculture.

Most counties, however, suffered losses of farmland and cropland, as depicted in Figure 2.30 and Figure 2.31. Barnstable and Franklin Counties had small increases in farmland and cropland over the period of 1974 to 1997. Worcester County lost the most farmland, followed by Hampshire and Berkshire Counties. Worcester County also lost the most cropland, followed by Middlesex and Hampshire Counties.

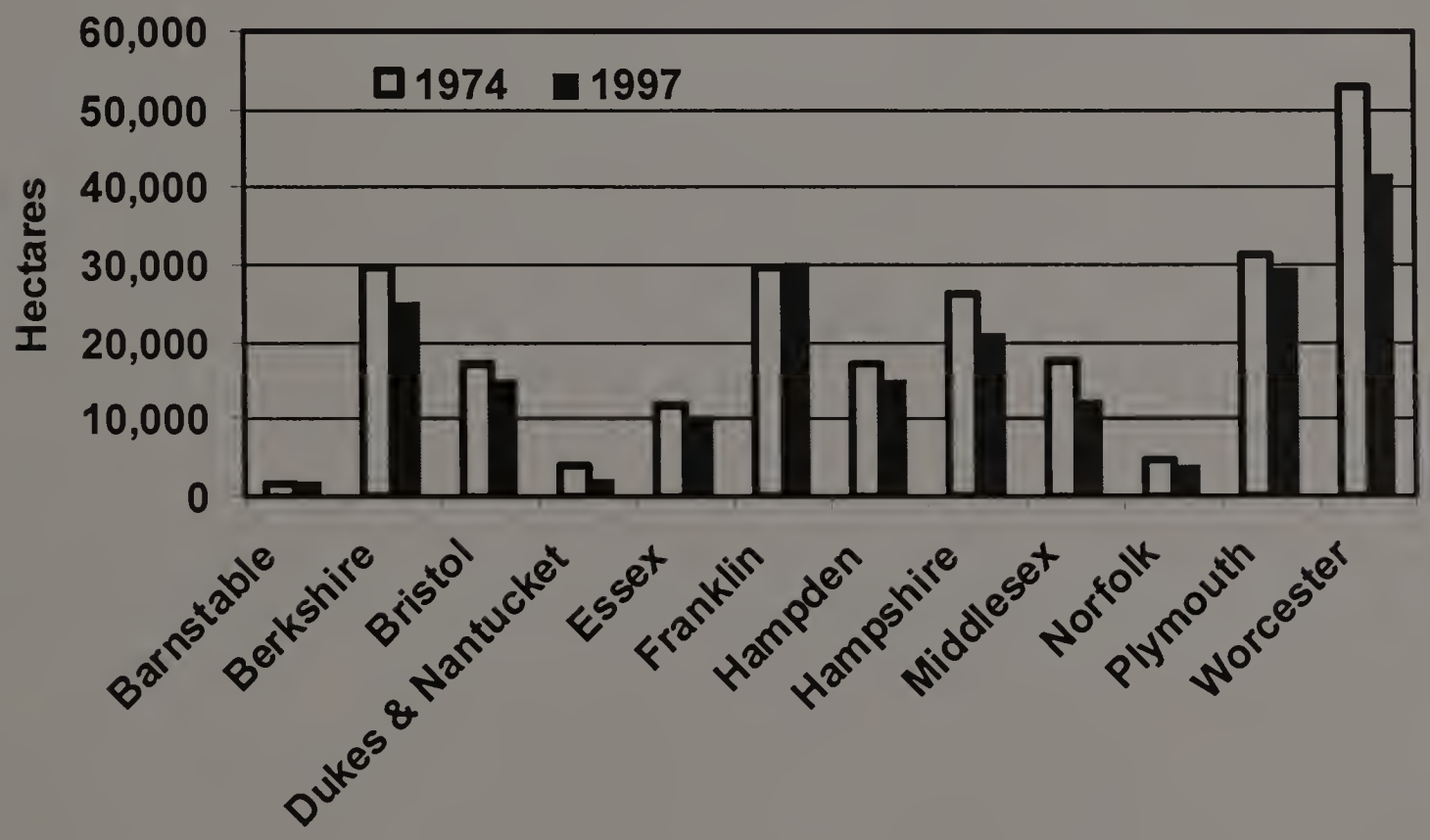

Figure 2.30. Land on farms in Massachusetts counties, 1974 and 1997. Source of data: U.S. Census of Agriculture.

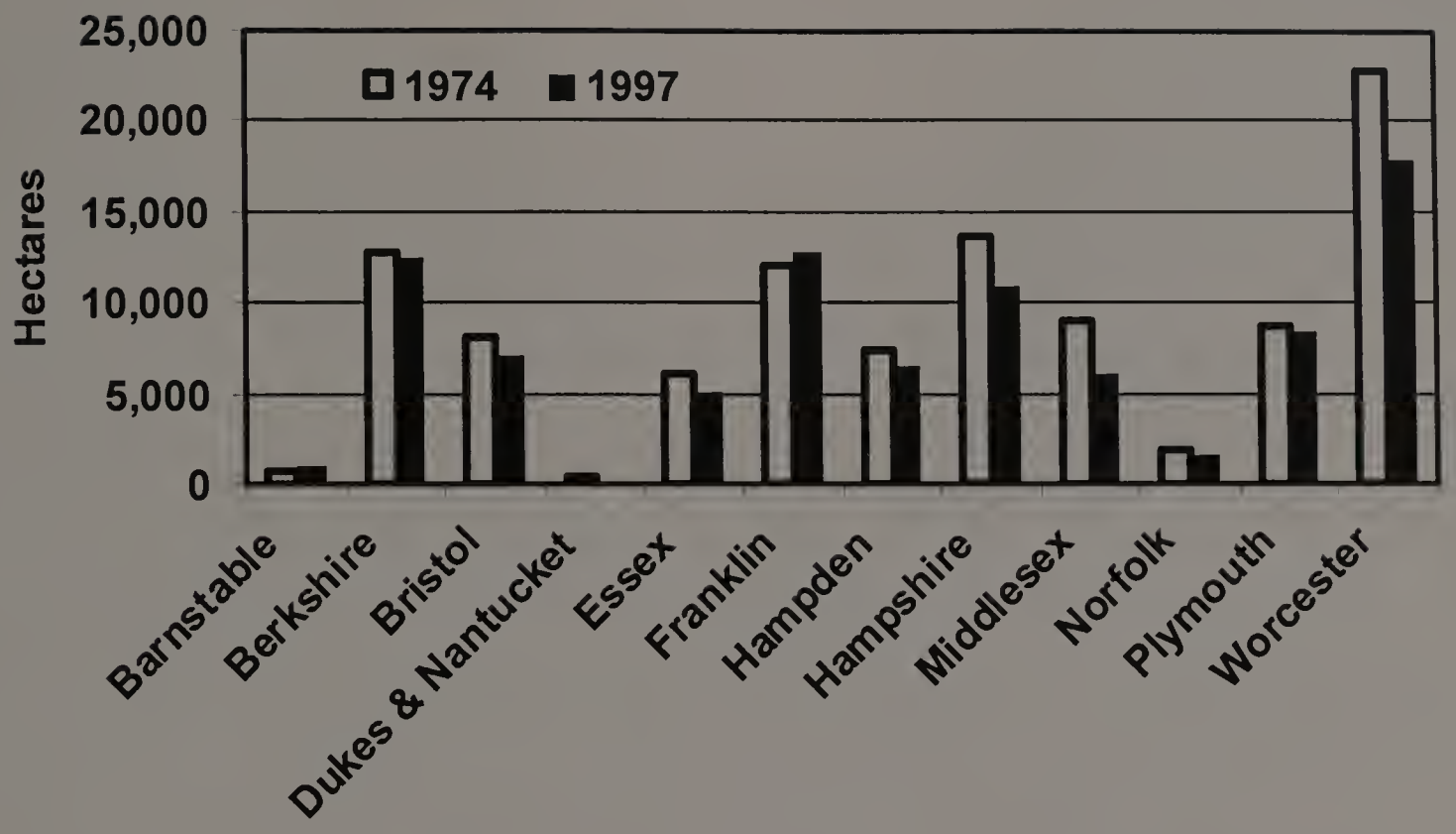

Figure 2.31. Cropland on farms, Massachusetts counties, 1974 and 1997. Source of data: U.S. Census of Agriculture.

The increased importance of the product group of fruits, nuts, and berries and the product group of nursery and greenhouse to the state's agricultural economy can be seen among the nine counties where these product groups dominated the agricultural output (Table 2.7). The other Massachusetts counties had a varied agricultural profile, with no broad Census product category dominating the agricultural activity of the counties. The dramatic exception was Plymouth County, which specialized in the product group of fruits, nuts, and berries (primarily cranberries), with 91.4 percent of its 1997 agricultural sales devoted to this Census category. Plymouth County had distinguished itself as the "cranberry country" for many years and even in 1987 had a highly specialized agricultural profile. Middlesex County demonstrated a rapid increase in the product group of nursery and greenhouse as that category accounted for 71.6

percent of the county's agricultural sales in 1997, up from 45.3 percent in 1987. The product group of dairy declined in importance, no longer the primary agricultural activity of most counties. Indeed, in 1997, no county had dairy sales accounting for more than half of its agricultural sales. Berkshire County had the highest specialization in dairy with 46.2 percent in 1997, but this figure was a decrease of about 5 percentage-points from 1987. The remaining two counties where dairy was the leading category of agricultural sales, Hampshire and Franklin, also had decreases in dairy. Hampshire County had the most dramatic drop in dairy sales, from 33.6 percent in 1987 to less than 20 percent by 1997. Franklin County's dairy sales declined from 44.8 percent in 1987 to 30 percent by 1997.

Table 2.7. Massachusetts counties and their dominant agricultural product groups in 1997.

		Percent of total sales	
County	Leading product group in 1997	1987	1997
Plymouth	Fruits, nuts, and berries	87.8	91.4
Middlesex	Nursery and greenhouse	45.3	71.6
Barnstable	Fruits, nuts, and berries	59.9	66.9
Norfolk	Nursery and greenhouse	57.8	66.9
Essex	Nursery and greenhouse	48.5	57.2
Berkshire	Dairy	51.8	46.2
Nantucket	Nursery and greenhouse	15.5	36.0
Bristol	Nursery and greenhouse	40.5	32.6
Franklin	Dairy	44.8	30.0
Worcester	Nursery and greenhouse	12.8	29.9
Hampden	Nursery and greenhouse	29.7	28.9
Hampshire	Dairy	33.6	19.8
Dukes	Vegetables, sweet corn, melons	(NA)	18.2

(NA) = Data not available
Source of data for calculations: U.S. Census of Agriculture.

Barnstable County

Barnstable County's land base included 5 percent of the Commonwealth's land but less than 1 percent of the farmland (Table 2.6). Barnstable County had 4 percent of the state's farms, accounting for 4 percent of Massachusetts agricultural sales (Figure 2.27).

From 1974 to 1997, agriculture in Barnstable County grew. The number of farms, amount of farmland, and sales of farm products increased. Sales of the county's major commodity group of fruit, nuts, and berries increased mainly due to expanded cranberry production. There were increased sales in the group of nursery and greenhouse crops and in the group of vegetables, sweet corn, and melons. Direct-to-consumer sales and the number of farms using direct sales also increased.

In Barnstable County, farm product sales increased from $2 million in 1974 to $18 million in 1997 (Table 2.8). The average sales per farm more than quadrupled, rising from $20,108 in 1974 to $82,466 in 1997. These significant nominal increases were also real increases when adjusted by the Producer Price Index for farm products.

Table 2.8. Agricultural product sales, Barnstable County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	102	117	123	158	144	221
Total sales, ($1,000)	$2,051	$2,048	$3,989	$6,800	$8,700	$18,225
Total sales adjusted by PPI ($1,000)	$2,650	$2,335	$3,989	$7,120	$8,398	$16,157
Average sales per farm	$20,108	$17,502	$32,432	$43,041	$60,415	$82,466
Average sales per farm, adjusted by PPI	$25,979	$19,957	$32,432	$45,069	$58,316	$73,108
All crops (farms)	97	104	102	129	126	167
All crops ($1,000)	$1,934	$1,973	(D)	$6,377	(D)	$17,218
grains (farms)	(NA)	0	0	0	0	1
grains ($1,000)	(NA)	$0	$0	$0	$0	(D)
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	2	1	0	3	3
hay, silage, and field seeds ($1,000)	(NA)	(D)	(D)	$0	(D)	(D)
vegetables, sweet corn, melons (farms)	(NA)	19	22	20	26	32
vegetables, sweet corn, melons ($1,000)	(NA)	$112	$218	(D)	(D)	$410
fruits, nuts, and berries (farms)	(NA)	69	67	88	85	104
fruits, nuts, and berries ($1,000)	(NA)	$1,275	$2,869	$4,074	$5,669	$12,184
nursery and greenhouse crops (farms)	24	30	27	42	43	58
nursery and greenhouse crops ($1,000)	$1,080	$517	$655	$1,962	$2,425	$4,584
other crops (farms)	(NA)	5	1	3	3	4
other crops ($1,000)	(NA)	(D)	(D)	(D)	$7	$3

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

(continued on next page)

Table 2.8. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	15	29	34	41	21	73
All livestock ($1,000):	$116	(D)	(D)	$423	(D)	$1,007
poultry and poultry products (farms)	5	11	17	22	6	14
poultry and poultry products ($1,000)	$5	$16	(D)	$183	(D)	$54
dairy products (farms)	(NA)	2	3	1	1	1
dairy products ($1,000)	(NA)	(D)	(D)	(D)	(D)	(D)
cattle and calves (farms)	(NA)	9	10	8	5	8
cattle and calves ($1,000)	(NA)	$5	$29	(D)	$13	$21
hogs and pigs (farms)	(NA)	5	8	1	1	2
hogs and pigs ($1,000)	(NA)	$2	$9	(D)	(D)	(D)
sheep, lambs, and wool (farms)	(NA)	7	7	12	4	8
sheep, lambs, and wool ($1,000)	(NA)	(D)	$5	(D)	(D)	$8
other livestock, livestock products (farms)	(NA)	18	14	17	12	51
other livestock, livestock products ($1,000)	(NA)	$39	$100	$166	(D)	$848

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Barnstable County's major commodity group, fruits, nuts, and berries, was 62 percent of the county's agricultural sales in 1978 and 67 percent in 1997. There were 69 farms producing fruits, nuts, and berries in 1978 and 104 in 1997, an increase of 35 farms. The major portion of the fruits, nuts, and berries group was cranberries, which increased in production from 1,967 tonne in 1974 to 9,098 tonne in 1997. Second in Barnstable County's agricultural sales in 1997 was the group nursery and greenhouse crops, comprising 25 percent of the county's total agricultural sales. The number of farms engaged in nursery and greenhouse crop production more than doubled, from 24 in 1974 to 58 in 1997. Third in sales in 1997, the group vegetables, sweet corn, and melons represented two percent of Barnstable County's total agricultural production.

The number of farms increased from 102 in 1974 to 221 in 1997, a gain of 119 farms (Table 2.9). Farmland increased from 1,819 hectares in 1974 to 2,161 hectares in 1992 and then declined to 1,921 hectares in 1997, an ending differential of plus 102 hectares. Cropland increased from 768 hectares in 1974 to 1,009 hectares in 1997, a gain of 241 hectares.

The number of farms direct marketing agricultural products nearly doubled from 30 in 1978 to 58 in 1997, with total direct sales rising from $133,000 to $259,000, an increase of $126,000. Average direct sales from farms using direct marketing in Barnstable County were $4,472 in 1997.

Table 2.9. Selected farm data for Barnstable County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 102,505						
Land in farms (hectares)	1,819	1,684	2,028	(D)	2,161	1,921
Total cropland (hectares)	768	622	733	754	(D)	1,009
Irrigated land (hectares)	377	316	403	512	515	739
Average size of farm (hectares)	18	15	17	(D)	15	8
Farms (number)	102	117	123	158	144	221
Estimated market value, nominal dollars						
land and buildings: average per farm	$120,235	$136,205	$198,593	$319,338	$386,004	$329,469
land and buildings: average per hectare	$6,741	$8,085	$10,121	$32,834	$32,174	$38,977
machinery and equipment: average per farm	$14,177	$18,346	$21,526	$31,149	$32,301	$32,189
Total farm production expenses						
($1,000 nominal)	$1,576	(NA)	(NA)	$4,663	$5,958	$11,055
average per farm (dollars)	$15,451	(NA)	(NA)	$29,701	$40,807	$50,023
Net cash return from sales						
total ($1,000 nominal)	$475	(NA)	(NA)	$2,035	$2,305	$7,036
average per farm (dollars)	$4,657	(NA)	(NA)	$12,963	$15,788	$31,837
number of farms with net gains	(NA)	(NA)	(NA)	99	101	165
number of farms with net losses	(NA)	(NA)	(NA)	58	45	56
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$100	$62	$0
Government payments ($1,000)	(NA)	(NA)	(NA)	$4	$148	$27
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$121	$141	$289
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$0	(D)	(D)

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Table 2.9. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	30	32	(NA)	25	58
total (nominal dollars in thousands)	(NA)	$133	$271	(NA)	$119	$259
average per farm (nominal dollars)	(NA)	$4,433	$8,469	(NA)	$4,746	$4,472
Operators by principal occupation						
Farming	42	74	56	85	89	110
Other	49	43	67	73	55	111
Average age of operator (years)	56.1	54.0	53.2	52.3	52.3	53.5
Operators by days worked off farm						
None	23	54	42	67	60	70
Any	54	58	79	84	75	138
200 days or more	34	32	47	50	35	74
Farm employment, hired farm labor						
farms with hired farm labor	42	45	51	(NA)	85	104
hired farm labor (number workers hired)	553	252	272	(NA)	364	557
hired farm labor (payroll in thousands)	$569	$337	$485	$1,427	$2,027	$3,066
working 150 days or more (workers)	97	55	86	(NA)	101	128
working fewer than 150 days (workers)	456	197	186	(NA)	263	429
Year 1997 top commodity group sales	nominal dollars in thousands					
fruits, nuts, and berries	(NA)	$1,275	$2,869	$4,074	$5,669	$12,184
nursery and greenhouse crops	$1,080	$517	$655	$1,962	$2,425	$4,584

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

Net cash returns from agricultural sales averaged $34,837 per farm in Barnstable County in 1997. Twenty-five percent of farms experienced net losses in 1997, a twelve-percentage-point decrease from the 37 percent of farms with losses in 1987.

Hired labor was used on 104 farms in 1997. A total of 557 workers received $3.1 million in payroll. Most workers, 77 percent, were seasonal, with 429 working fewer than 150 days.

In 1997, the average age of farmers in Barnstable County was 53.5 years, a decrease from 56.1 in 1974, and lower than the state average in 1997 of 54.9 years. There was an increase in the percentage of Barnstable County farmers (48 percent) who had principal occupations other than farming in 1997, 48 percent, up from 39 percent in 1974.

Berkshire County

Berkshire County's land area represented 11.9 percent of the Commonwealth's land, 12 percent of the farmland, and 13.8 percent of the cropland (Table 2.6). It had 6.9 percent of the state's farms, accounting for 4.6 percent of Massachusetts agricultural sales (Figure 2.27).

From the year 1974 to 1997, agriculture in Berkshire County grew in numbers of farms and farm product sales but lost farmland and cropland. Sales in Berkshire County doubled from $10.5 million in 1974 to $20.7 million in 1997 (Table 2.10). The average sales per farm also increased, rising from $34,446 in 1974 to $53,553 in 1997. These nominal increases were also real increases as adjusted by the Producer Price Index for farm products. Agriculture remained diversified and total sales increased because real dollar losses in livestock sales were compensated for by increased crop sales. The decrease in dairy was compensated for by a large increase in nursery and greenhouse production. Direct-to-consumer sales and the number of farms using direct sales increased.

The major commodity group in Berkshire County was dairy. It was the largest product group in 1978 when it represented 68 percent of the county's total agricultural sales, remaining so in 1997 at 46 percent of the county's sales. Although dairy sales increased in nominal dollars, sales actually decreased in dollars adjusted by the Producer Price Index. The number of dairy farms decreased approximately 60 percent, from 110 farms in 1978 to 43 in 1997. Second in sales to dairy in 1997 was the group of nursery and greenhouse crops, which more than quadrupled from less than 5 percent of Berkshire County's total agricultural sales in 1978 to 23 percent of total sales in 1997. The number of farms producing nursery and greenhouse crops increased from 28 farms in 1978 to 81 in 1997, an increase of 53 farms. Third in sales in 1997 was the commodity group of hay, silage, and field seeds, representing 7 percent of Berkshire

Table 2.10. Agricultural product sales, Berkshire County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	305	318	352	392	320	387
Total sales, ($1,000)	$10,506	$13,289	$16,542	$17,564	$17,967	$20,725
Total sales adjusted by PPI ($1,000)	$13,574	$15,153	$16,542	$18,392	$17,343	$18,373
Average sales per farm	$34,446	$41,788	$46,994	$44,805	$56,145	$53,553
Average sales per farm, adjusted by PPI	$44,504	$47,649	$46,994	$46,916	$54,194	$47,476
All crops (farms)	171	148	181	187	192	261
All crops ($1,000)	$1,594	$1,850	$2,689	$4,430	$4,641	$8,294
grains (farms)	(NA)	9	12	7	7	10
grains ($1,000)	(NA)	(D)	$199	$109	(D)	$358
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	86	122	119	123	129
hay, silage, and field seeds ($1,000)	(NA)	$432	$563	$932	$1,038	$1,474
vegetables, sweet corn, melons (farms)	(NA)	48	43	46	52	50
vegetables, sweet corn, melons ($1,000)	(NA)	(D)	(D)	$542	$682	$1,165
fruits, nuts, and berries (farms)	(NA)	22	23	31	27	34
fruits, nuts, and berries ($1,000	(NA)	$321	$430	(D)	$451	$384
nursery and greenhouse crops (farms)	19	28	25	32	36	81
nursery and greenhouse crops ($1,000)	$488	$740	$1,007	$2,328	$2,299	$4,812
other crops (farms)	(NA)	5	6	3	1	35
other crops ($1,000)	(NA)	$61	(D)	(D)	(D)	$101

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.10. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	234	230	268	259	192	212
All livestock ($1,000):	$8,779	$11,439	$13,852	$13,134	$13,325	$12,432
poultry and poultry products (farms)	35	25	29	24	21	26
poultry and poultry products ($1,000)	$887	$1,134	$1,171	$2,338	$2,203	$1,159
dairy products (farms)	(NA)	110	95	66	54	43
dairy products ($1,000)	(NA)	$9,041	$11,098	$9,100	$9,766	$9,578
cattle and calves (farms)	(NA)	196	211	197	135	133
cattle and calves ($1,000)	(NA)	$1,116	$1,307	$1,357	$918	$846
hogs and pigs (farms)	(NA)	24	26	23	21	25
hogs and pigs ($1,000)	(NA)	$24	$43	$24	$45	$94
sheep, lambs, and wool (farms)	(NA)	14	31	40	37	40
sheep, lambs, and wool ($1,000)	(NA)	$11	$35	$41	$27	$27
other livestock, livestock products (farms)	(NA)	24	35	40	31	44
other livestock, livestock products ($1,000)	(NA)	$113	$198	$274	$367	$727

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

County's total agricultural sales. Next was the category of vegetables, sweet corn, and melons and the category of poultry and poultry products, each of which represented 6 percent of the county's agricultural product sales.

The number of farms in Berkshire County increased from 305 farms in 1974 to 387 in 1997, a gain of 82 farms. Farmland decreased from 29,588 hectares in 1974 to 25,429 in 1997, a loss of 4,159 hectares. Cropland decreased from 12,725 hectares in 1974 to 12,462 in 1997, a loss of 263 hectares (Table 2.11).

The number of farms using direct marketing to sell agricultural products increased from 60 in 1978 to 90 in 1997, a gain of 30 farms, with total direct sales in nominal dollars rising from $473,000 to $684,000, an increase of $211,000. Average direct sales from farms using direct marketing in Berkshire County were $7,595 in 1997.

Net cash returns from agricultural sales averaged $5,939 per farm in Berkshire County in 1997. Fifty-nine percent of farms experienced net losses in 1997, which was less than the 66 percent of farms reporting net losses in 1992, but still a four-percentage-point increase from the 55 percent with losses in 1987. Hired labor was used on 142 farms in 1997. A total of 566 workers received $2.7 million in payroll. Most employees, 69 percent, were seasonal, with 391 working fewer than 150 days.

Table 2.11. Selected farm data for Berkshire County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 241,234						
Land in farms (hectares)	29,588	28,821	29,719	28,650	24,679	25,429
Total cropland (hectares)	12,725	13,972	13,787	12,924	11,891	12,462
Irrigated land (hectares)	23	32	55	33	32	45
Average size of farm (hectares)	97	91	85	73	77	66
Farms (number)	305	318	352	392	320	387
Estimated market value, nominal dollars						
land and buildings: average per farm	$169,249	$206,553	$226,719	$386,964	$515,652	$546,679
land and buildings: average per hectare	$1,745	$2,439	$3,039	$4,964	$8,216	$7,784
machinery and equipment: average per farm	$21,449	$26,653	$28,729	$30,510	$39,098	$34,905
Total farm production expenses						
($1,000 nominal)	$9,364	(NA)	(NA)	$13,371	$15,973	$17,957
average per farm (dollars)	$30,702	(NA)	(NA)	$33,937	$50,071	$46,281
Net cash return from sales						
total ($1,000 nominal)	$1,142	(NA)	(NA)	$2,835	$2,291	$2,304
average per farm (dollars)	$3,744	(NA)	(NA)	$7,197	$7,182	$5,939
number of farms with net gains	(NA)	(NA)	(NA)	176	113	158
number of farms with net losses	(NA)	(NA)	(NA)	218	206	230
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$36	$132	$86
Government payments ($1,000)	(NA)	(NA)	(NA)	$231	$77	$98
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$76	(D)	$15
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$14	(D)	$62

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.11. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	60	84	(NA)	71	90
total (nominal dollars in thousands)	(NA)	$473	$428	(NA)	$449	$684
average per farm (nominal dollars)	(NA)	7,883	5,095	(NA)	$6,327	$7,595
Operators by principal occupation						
Farming	192	208	191	195	185	194
Other	106	110	161	197	135	193
Average age of operator (years)	53.7	52.7	52.2	53.5	54.3	55.2
Operators by days worked off farm						
None	134	166	152	165	144	164
Any	128	141	178	200	155	209
200 days or more	73	86	117	137	97	133
Farm employment, hired farm labor						
farms with hired farm labor	139	146	181	(NA)	103	142
hired farm labor (number workers hired)	796	732	677	(NA)	403	566
hired farm labor (payroll in thousands)	$1,147	$1,414	(D)	$2,717	$2,919	$2,723
working 150 days or more (workers)	211	281	277	(NA)	198	175
working fewer than 150 days (workers)	585	451	400	(NA)	205	391
Year 1997 top commodity group sales	nominal dollars in thousands					
dairy products	(NA)	$9,041	$11,098	$9,100	$9,766	$9,578
nursery and greenhouse crops	$488	$740	$1,007	$2,328	$2,299	$4,812
hay, silage, and field seeds	(NA)	$432	$563	$932	$1,038	$1,474
vegetables, sweet corn, and melons	(NA)	(D)	(D)	$542	$682	$1,165
poultry and poultry products	$887	$1,134	$1,171	$2,338	$2,203	$1,159

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

In 1997, the average age of farmers in Berkshire County was 55.2 years, an increase from 53.7 years in 1974, but lower than the state average in 1997 of 54.9 years. Fifty percent of Berkshire County farmers had principal occupations other than farming in 1997, a fourteen-percentage-point increase from the 36 percent in 1974.

Bristol County

Bristol County's land area represented 7.1 percent of the Commonwealth's land, 7.2 percent of the farmland, and 7.9 percent of the cropland (Table 2.6). Bristol County had 10 percent of the state's farms, accounting for 7.5 percent of Massachusetts agricultural sales (Figure 2.27).

Bristol County agriculture remained diversified and large losses in the livestock sector were compensated for by increased crop sales and direct-to-consumer marketing. Although real dollar sales decreased for dairy, a larger increase in nursery and greenhouse sales compensated for dairy losses. A large sales increase in the fruits, nuts, and berries category was mainly due to increased cranberry production (Table 2.12). Agricultural sales in Bristol County more than doubled, from $15.6 million in 1974 to $34.1 million in 1997. The average sales per farm also increased, from $30,640 in 1974 to $61,444 in 1997. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.13).

Table 2.12. Agricultural product sales, Bristol County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	511	554	597	675	523	555
Total sales, ($1,000)	$15,657	$19,657	$28,260	$29,971	$29,614	$34,102
Total sales adjusted by PPI ($1,000)	$20,229	$22,414	$28,260	$31,383	$28,585	$30,232
Average sales per farm	$30,640	$35,482	$47,337	$44,401	$56,624	$61,444
Average sales per farm, adjusted by PPI	$39,587	$40,458	$47,337	$46,493	$54,656	$54,472
All crops (farms)	304	322	357	385	349	381
All crops ($1,000)	$5,297	$8,307	$11,920	$19,189	$19,810	$25,084
grains (farms)	(NA)	1	5	5	6	10
grains ($1,000)	(NA)	(D)	(D)	(D)	(D)	$61
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	107	118	141	125	142
hay, silage, and field seeds ($1,000)	(NA)	$358	$642	$678	$838	(D)
vegetables, sweet corn, melons (farms)	(NA)	155	156	138	120	105
vegetables, sweet corn, melons ($1,000)	(NA)	$2,218	$3,042	$3,747	$4,614	$6,517
fruits, nuts, and berries (farms)	(NA)	64	93	94	95	110
fruits, nuts, and berries ($1,000	(NA)	$758	$1,967	$2,497	$4,274	$6,362
nursery and greenhouse crops (farms)	66	75	87	86	111	124
nursery and greenhouse crops ($1,000)	$2,207	$4,831	$6,065	$12,135	$9,948	$11,121
other crops (farms)	(NA)	18	14	7	4	7
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	(D)

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.12. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	285	303	317	336	230	215
All livestock ($1,000):	$10,324	$11,350	$16,340	$10,782	$9,805	$9,018
poultry and poultry products (farms)	52	61	50	46	35	36
poultry and poultry products ($1,000)	$2,409	$1,655	$4,990	$1,922	$367	$72
dairy products (farms)	(NA)	93	94	65	41	36
dairy products ($1,000)	(NA)	$6,825	$8,663	$6,072	$5,865	$7,053
cattle and calves (farms)	(NA)	201	212	198	141	134
cattle and calves ($1,000)	(NA)	$1,806	$1,738	$1,467	$2,602	$1,209
hogs and pigs (farms)	(NA)	64	68	65	45	50
hogs and pigs ($1,000)	(NA)	$769	$669	$709	$504	$394
sheep, lambs, and wool (farms)	(NA)	31	39	51	45	33
sheep, lambs, and wool ($1,000)	(NA)	$15	$29	$52	$49	$39
other livestock, livestock products (farms)	(NA)	54	53	75	43	54
other livestock, livestock products ($1,000)	(NA)	$280	$250	$560	$417	$251

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.13. Selected farm data for Bristol County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 144,018						
Land in farms (hectares)	17,027	18,377	16,950	17,225	13,855	15,044
Total cropland (hectares)	8,203	9,761	8,580	8,493	7,391	7,122
Irrigated land (hectares)	660	576	541	688	730	795
Average size of farm (hectares)	33	33	28	25	26	27
Farms (number)	511	554	597	675	523	555
Estimated market value, nominal dollars						
land and buildings: average per farm	$104,820	$171,915	$164,087	$267,392	$447,338	$456,486
land and buildings: average per hectare	$3,146	$4,967	$5,789	$10,998	$15,364	$18,841
machinery and equipment: average per farm		$21,811	$20,348	$26,978	$31,595	$30,941
Total farm production expenses						
($1,000 nominal)	$13,832	(NA)	(NA)	$20,696	$22,515	$22,066
average per farm (dollars)	$27,068	(NA)	(NA)	$30,752	$43,133	$39,758
Net cash return from sales						
total ($1,000 nominal)	$1,825	(NA)	(NA)	$8,360	$6,794	$11,008
average per farm (dollars)	$3,572	(NA)	(NA)	$12,421	$13,015	$19,835
number of farms with net gains	(NA)	(NA)	(NA)	313	275	270
number of farms with net losses	(NA)	(NA)	(NA)	360	247	285
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$63	$369	$9
Government payments ($1,000)	(NA)	(NA)	(NA)	$218	$410	$73
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$91	$106	$112
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$70	$105	$135

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.13. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	129	174	(NA)	107	117
total (nominal dollars in thousands)	(NA)	$860	$1,648	(NA)	$2,262	$2,292
average per farm (nominal dollars)	(NA)	6,667	9,471	(NA)	$21,144	$19,587
Operators by principal occupation						
Farming	312	317	314	358	298	310
Other	168	237	283	317	225	245
Average age of operator (years)	53.1	51.7	50.2	52.0	52.4	55.0
Operators by days worked off farm						
None	197	244	230	275	228	238
Any	186	288	329	350	263	284
200 days or more	132	198	220	245	173	165
Farm employment, hired farm labor						
farms with hired farm labor	210	306	209	(NA)	186	166
hired farm labor (number workers hired)	1,569	2,269	1,239	(NA)	1,194	659
hired farm labor (payroll in thousands)	$1,856	$2,783	$2,741	$4,629	$5,447	$4,170
working 150 days or more (workers)	317	458	458	(NA)	406	249
working fewer than 150 days (workers)	1,252	1,811	781	(NA)	788	410
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$2,207	$4,831	$6,065	$12,135	$9,948	$11,121
dairy products	(NA)	$6,825	$8,663	$6,072	$5,865	$7,053
vegetables, sweet corn, and melons	(NA)	$2,218	$3,042	$3,747	$4,614	$6,517
fruits, nuts, and berries	(NA)	$758	$1,967	$2,497	$4,274	$6,362
cattle and calves	(NA)	$1,806	$1,738	$1,467	$2,602	$1,209

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms
Source: U.S. Census of Agriculture, various years.

Most agricultural sales in 1997 were from the commodity group of nursery and greenhouse crops, which increased from 25 percent of Bristol County's total agricultural sales in 1978 to 33 percent in 1997. The number of farms producing nursery and greenhouse crops increased from 75 in 1978 to 124 farms in 1997. Second in Bristol County's agricultural sales was the group of dairy, which was the largest category in 1978, comprising 35 percent of total sales but only making up 21 percent of the county's sales in 1997. The 36 dairy farms remaining in 1997 were fewer than half of the number in 1978, when there were 93 farms. Although nominal sales increased, dairy product sales actually decreased in dollars adjusted by the Producer Price Index. Third in agricultural sales in 1997 was the group of vegetables, sweet corn, and melons, representing 19 percent of Bristol County's agricultural sales and the group of fruits, nuts, and berries, which also represented 19 percent of sales. The growth of sales in fruits, nuts, and berries was bolstered by the rapid expansion of cranberry production in Bristol County, with a production increase from 163 hectares in 1974 to 265 hectares in 1997, a gain of 102 hectares. Sales of cattle and calves represented 4 percent of sales in 1997, down from 9 percent of sales in 1978.

Although the number of farms and sales of farm products increased in Bristol County, the county lost farmland and cropland (Table 2.13). The number of farms increased from 511 in 1974 to 675 farms in 1987, but subsequently declined to 555 farms in 1997, a final differential gain of 44 farms. Land on farms

decreased from 17,027 hectares in 1974 to 15,044 hectares in 1997. Cropland decreased from 8,203 hectares in 1974 to 7,122 hectares in 1997.

The number of farms using direct marketing to sell agricultural products decreased from 129 farms in 1978 to 117 in 1997, a loss of 12 farms, but total direct sales in nominal dollars increased from $0.9 million to $2.3 million, a gain of $1.4 million. Average direct sales from Bristol County farms using direct marketing were $19,587 in 1997.

Net cash returns from agricultural sales averaged $19,835 per farm in Bristol County in 1997. Fifty-one percent of farms experienced net losses in 1997, a 2 percent decrease from the 53 percent with losses in 1987.

Hired labor was used on 166 farms in 1997. A total of 659 workers received $4.2 million in payroll. Most employees, 62 percent, were seasonal, with 410 working fewer than 150 days.

In 1997, the average age of farmers in Bristol County was 55 years, a two-year increase from the average of 53 in 1974, and about the same as the state average in 1997 of 54.9 years. Forty-four percent of Bristol County farmers had principal occupations other than farming in 1997, an increase from 35 percent in 1974.

Dukes County

Dukes County is small, accounting for 1.3 percent of the Commonwealth's land, including 0.9 percent of the farmland (Table 2.6). It had 1.1 percent of the state's farms, accounting for 0.28 percent of Massachusetts agricultural sales (Figure 2.27). Farm product sales (Table 2.14) and the number of farms (Table 2.15) increased from the year 1974 to 1997.

Although from 1974 to 1997, Dukes County increased the number of its farms and the amount of its cropland, it lost much of its farmland. Farm numbers nearly tripled, from 22 farms in 1974 to 64 in 1997. Cropland also increased from 318 hectares in 1974 to 890 hectares in 1987 but then declined to 552 hectares in 1997, a final differential of plus 234 hectares. After an initial increase in farmland from 3,689 hectares in 1974 to 4,768 hectares in 1978, farmland declined in each census year thereafter, ending at 1,981 hectares in 1997, an overall loss of 1,708 hectares.

Agricultural sales in Dukes County increased from $164,000 in 1974 to $1.25 million in 1997. The average agricultural sales per farm also increased, rising from $7,455 in 1974 to $19,524 in 1997. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.14).

Table 2.14. Agricultural product sales, Dukes County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	22	53	40	58	56	64
Total sales, ($1,000)	$164	$363	$688	D	$849	$1,250
Total sales adjusted by PPI ($1,000)	$212	$414	$688		$819	$1,108
Average sales per farm	$7,455	$6,848	$17,210	D	$15,163	$19,524
Average sales per farm, adjusted by PPI	$9,632	$7,808	$17,210		$14,636	$17,309
All crops (farms)	15	41	25	34	41	43
All crops ($1,000)	$121	$235	$318	$462	$731	$986
grains (farms)	(NA)	1	0	1	0	1
grains ($1,000)	(NA)	(D)	$0	(D)	$0	(D)
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	14	9	10	12	13
hay, silage, and field seeds ($1,000)	(NA)	$32	$54	$26	$37	$114
vegetables, sweet corn, melons (farms)	(NA)	13	19	11	16	10
vegetables, sweet corn, melons ($1,000)	(NA)	$112	$178	$224	$391	$227
fruits, nuts, and berries (farms)	(NA)	4	6	7	9	9
fruits, nuts, and berries ($1,000	(NA)	(D)	(D)	$28	$31	(D)
nursery and greenhouse crops (farms)	7	14	7	12	11	17
nursery and greenhouse crops ($1,000)	$51	$83	$78	$179	$260	(D)
other crops (farms)	(NA)	3	1	4	8	4
other crops ($1,000)	(NA)	(D)	(D)	(D)	$12	$10

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.14. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	15	30	23	34	26	36
All livestock ($1,000):	$41	$128	$371	(D)	$118	$264
poultry and poultry products (farms)	4	11	10	11	9	12
poultry and poultry products ($1,000)	$1	$6	$3	(D)	$11	$10
dairy products (farms)	(NA)	5	6	3	4	0
dairy products ($1,000)	(NA)	(D)	(D)	(D)	$17	$0
cattle and calves (farms)	(NA)	20	12	11	14	11
cattle and calves ($1,000)	(NA)	(D)	$57	(D)	$32	$37
hogs and pigs (farms)	(NA)	6	13	7	10	11
hogs and pigs ($1,000)	(NA)	$14	$8	$19	$29	$20
sheep, lambs, and wool (farms)	(NA)	6	8	20	10	13
sheep, lambs, and wool ($1,000)	(NA)	(D)	$16	$53	$16	$22
other livestock, livestock products (farms)	(NA)	5	3	7	5	6
other livestock, livestock products ($1,000)	(NA)	(D)	(D)	$0	$14	$175

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.15. Selected farm data for Dukes County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 26,890						
Land in farms (hectares)	3,689	4,768	2,977	2,960	2,330	1,981
Total cropland (hectares)	318	818	597	890	653	552
Irrigated land (hectares)	20	(D)	28	(D)	40	38
Average size of farm (hectares)	168	90	74	51	42	31
Farms (number)	22	53	40	58	56	64
Estimated market value, nominal dollars						
land and buildings: average per farm	$356,727	$411,358	$402,050	$460,328	$973,386	$660,929
land and buildings: average per hectare	$2,128	$4,571	$5,404	$9,019	$23,395	$21,349
machinery and equipment: average per farm	$13,900	$17,018	$27,419	$16,377	$20,897	$22,404
Total farm production expenses						
($1,000 nominal)	$196	(NA)	(NA)	$747	$1,010	$1,180
average per farm (dollars)	$8,909	(NA)	(NA)	$12,885	$18,037	$18,432
Net cash return from sales						
total ($1,000 nominal)	-$32	(NA)	(NA)	$76	(D)	$70
average per farm (dollars)	-$1,454	(NA)	(NA)	$1,302	(D)	$1,092
number of farms with net gains	(NA)	(NA)	(NA)	20	18	24
number of farms with net losses	(NA)	(NA)	(NA)	38	38	40
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	(D)	$9	$12
Government payments ($1,000)	(NA)	(NA)	(NA)	$5	$16	$23
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$9	(D)	(D)
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$0	$0	(D)

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.15. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	19	24	(NA)	18	21
total (nominal dollars in thousands)	(NA)	(D)	(D)	(NA)	$328	$268
average per farm (nominal dollars)	(NA)	(D)	(D)	(NA)	$18,195	$12,753
Operators by principal occupation						
Farming	9	23	21	30	28	32
Other	9	30	19	28	28	32
Average age of operator (years)	51.9	55.5	48.1	52.9	53.8	51.5
Operators by days worked off farm						
None	5	17	12	23	12	13
Any	11	36	27	34	31	45
200 days or more	6	21	11	21	18	20
Farm employment, hired farm labor						
farms with hired farm labor	9	23	24	(NA)	22	25
hired farm labor (number workers hired)	51	133	120	(NA)	93	157
hired farm labor (payroll in thousands)	$48	$93	$202	$120	$160	(D)
working 150 days or more (workers)	8	17	17	(NA)	17	46
working fewer than 150 days (workers)	43	116	103	(NA)	76	111
Year 1997 top commodity group sales	nominal dollars in thousands					
vegetables, sweet corn, and melons	(NA)	$112	$178	$224	$391	$227
other livestock and livestock products	(NA)	(D)	(D)	$0	$14	$175
hay, silage, and field seeds	(NA)	$32	$54	$26	$37	$114

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

The top selling commodity groups of Dukes County in 1997 included the group of vegetables, sweet corn, and melons, grown on ten farms, and the group of nursery and greenhouse crops, produced on 17 farms. The third top group was hay, silage, and field seeds, produced on 13 farms.

Direct marketing sales were 20 percent of sales from the county's farms, much greater than the state average of 4.4 percent. Twenty-one farms in Dukes County used direct marketing in 1997, with total direct sales of $268,000. Average direct sales from Dukes County farms using direct sales were $12,753.

Net cash returns from agricultural sales averaged $1,092 per farm in Dukes County in 1997. Sixty-two percent of farms experienced net losses in 1997, a three-percentage-point decrease from the 65 percent of farms that had losses in 1987.

Hired labor was used on 25 farms in 1997. Farm employment totaled 157 workers 111 of whom (71 percent) were seasonal, working fewer than 150 days.

In 1997, the average age of farmers in Dukes County was 51.5 years, not much different from the average of 51.9 years in 1974, and lower than the state average in 1997 of 54.9 years. Fifty percent of Dukes County farmers had principal occupations other than farming in 1997.

Essex County

Essex County's land area represented 6.4 percent of the Commonwealth's land, including 4.9 percent of the farmland and 5.6 percent of the cropland (Table 2.6). It had 7.1 percent of the state's farms accounting for 5.5 percent of Massachusetts agricultural sales (Figure 2.27).

Essex County had increased numbers of farm and sales of farm products (Table 2.16) but lost farmland and cropland during the period from 1974 to 1997 (Table 2.17). While dairy sales decreased, nursery and greenhouse sales increased. Agriculture remained diversified, with real losses in livestock sales being compensated for by increases in crop sales. Direct-to-consumer sales increased, even though the number of farms using direct sales decreased.

Essex County increased its number of farms but lost farmland. Essex County had 311 farms in 1974 and 396 in 1997, an increase of 85 farms. Farmland decreased from 11,683 hectares in 1974 to 10,339 hectares in 1997, a loss of 1,344 hectares. Cropland decreased from 6,141 hectares in 1974 to 5,029 hectares in 1997, a loss of 1,112 hectares.

Agricultural sales in Essex County increased from $9.9 million in 1974 to $25.1 million in 1997. The average sales per farm more than doubled, rising from $31,916 in 1974 to $63,361 in 1997. These nominal dollar increases were

Table 2.16. Agricultural product sales, Essex County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	311	344	372	439	357	396
Total sales, ($1,000)	$9,926	$11,789	$13,920	$17,034	$17,769	$25,091
Total sales adjusted by PPI ($1,000)	$12,824	$13,442	$13,920	$17,837	$17,152	$22,244
Average sales per farm	$31,916	$34,271	$37,418	$38,803	$49,774	$63,361
Average sales per farm, adjusted by PPI	$41,235	$39,078	$37,418	$40,631	$48,044	$56,171
All crops (farms)	213	229	215	283	243	288
All crops ($1,000)	$5,493	$6,528	$7,485	$12,240	$13,955	$19,869
grains (farms)	(NA)	1	2	2	2	11
grains ($1,000)	(NA)	(D)	(D)	(D)	(D)	$52
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	84	84	119	88	104
hay, silage, and field seeds ($1,000)	(NA)	$609	$428	$875	$825	$1,134
vegetables, sweet corn, melons (farms)	(NA)	89	89	95	94	90
vegetables, sweet corn, melons ($1,000)	(NA)	$1,807	$1,869	$2,436	$3,335	$3,196
fruits, nuts, and berries (farms)	(NA)	47	45	63	58	42
fruits, nuts, and berries ($1,000	(NA)	$672	$648	$624	$961	$1,123
nursery and greenhouse crops (farms)	80	75	72	85	98	150
nursery and greenhouse crops ($1,000)	$3,549	$3,406	$4,517	$8,268	$8,821	$14,349
other crops (farms)	(NA)	16	10	10	7	12
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	$15

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.16. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	157	169	195	198	147	137
All livestock ($1,000):	$4,401	$5,261	$6,434	$4,794	$3,814	$5,222
poultry and poultry products (farms)	43	36	51	46	28	26
poultry and poultry products ($1,000)	$1,334	$1,416	$1,716	$1,330	$692	(D)
dairy products (farms)	(NA)	34	38	23	15	13
dairy products ($1,000)	(NA)	$2,616	$3,349	$2,167	$2,261	(D)
cattle and calves (farms)	(NA)	88	95	83	54	52
cattle and calves ($1,000)	(NA)	$747	$684	$654	$326	$414
hogs and pigs (farms)	(NA)	38	21	18	13	12
hogs and pigs ($1,000)	(NA)	$281	$58	$183	$75	(D)
sheep, lambs, and wool (farms)	(NA)	23	28	42	35	33
sheep, lambs, and wool ($1,000)	(NA)	$12	$30	$43	$30	$28
other livestock, livestock products (farms)	(NA)	52	55	77	58	60
other livestock, livestock products ($1,000)	(NA)	$189	$598	$418	$431	$648

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.17. Selected farm data for Essex County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 129,004						
Land in farms (hectares)	11,683	12,228	12,256	12,521	10,308	10,339
Total cropland (hectares)	6,141	6,747	6,437	6,771	5,789	5,029
Irrigated land (hectares)	505	370	237	355	378	499
Average size of farm (hectares)	38	36	33	28	29	26
Farms (number)	311	344	372	439	357	396
Estimated market value, nominal dollars						
land and buildings: average per farm	$145,463	$228,542	$257,987	$462,670	$781,091	$526,583
land and buildings: average per hectare	$3,872	$6,313	$8,359	$16,689	$31,433	$21,255
machinery and equipment: average per farm	$18,500	$29,749	$28,360	$33,053	$38,328	$54,306
Total farm production expenses						
($1,000 nominal)	$9,076	(NA)	(NA)	$12,946	$13,696	$16,144
average per farm (dollars)	$29,183	(NA)	(NA)	$29,490	$38,258	$40,872
Net cash return from sales						
total ($1,000 nominal)	$850	(NA)	(NA)	$3,418	$4,277	$9,107
average per farm (dollars)	$2,733	(NA)	(NA)	$7,786	$11,946	$23,055
number of farms with net gains	(NA)	(NA)	(NA)	182	150	194
number of farms with net losses	(NA)	(NA)	(NA)	257	208	201
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$176	$263	$83
Government payments ($1,000)	(NA)	(NA)	(NA)	$31	$93	$98
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$154	$230	$476
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	(D)	$65	(D)

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.17. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	87	102	(NA)	84	79
total (nominal dollars in thousands)	(NA)	$1,356	$1,522	(NA)	$1,748	$2,122
average per farm (nominal dollars)	(NA)	15,586	14,922	(NA)	$20,805	$26,867
Operators by principal occupation						
Farming	159	198	189	227	208	202
Other	126	146	183	212	149	194
Average age of operator (years)	55.1	51.5	51.7	54.1	53.4	55.6
Operators by days worked off farm						
None	107	145	138	179	175	173
Any	122	179	213	239	159	206
200 days or more	82	106	123	148	95	134
Farm employment, hired farm labor						
farms with hired farm labor	132	155	189	(NA)	158	187
hired farm labor (number workers hired)	1,340	1,134	944	(NA)	797	978
hired farm labor (payroll in thousands)	$2,071	$2,545	$2,098	$2,563	$3,449	$5,151
working 150 days or more (workers)	346	353	303	(NA)	289	275
working fewer than 150 days (workers)	994	781	641	(NA)	508	703
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$3,549	$3,406	$4,517	$8,268	$8,821	$14,349
vegetables, sweet corn, and melons	(NA)	$1,807	$1,869	$2,436	$3,335	$3,196
dairy products ($1,000)	(NA)	$2,616	$3,349	$2,167	$2,261	(D)
hay, silage, and field seeds	(NA)	$609	$428	$875	$825	$1,134
fruits, nuts, and berries	(NA)	$672	$648	$624	$961	$1,123

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.16).

Most agricultural sales in 1997 were from the commodity group of nursery and greenhouse crops. This category nearly doubled its share of county sales from 29 percent in 1978 to 57 percent in 1997. The number of farms engaged in nursery and greenhouse crop production doubled from 75 farms in 1978 to 150 in 1997. Second in Essex County sales was the category of vegetables, sweet corn, and melons, down from 15 percent of total sales in 1978 to 13 percent in 1997. Third in 1997 sales was the group of dairy with 13 percent of the county's sales, a reduction from 1978 when dairy was the second highest sales category with 22 percent of sales. The number of dairy farms also decreased from 34 farms in 1978 to 13 in 1997. Fourth in 1997 sales was the category of fruits, nuts, and berries, and fifth was the group of hay, silage, and field seeds; each category represented about 5 percent of total agricultural sales. Sales of cattle and calves declined from 6 percent of sales in 1978 to less than 2 percent of sales in 1997.

The number of farms direct marketing agricultural products declined from 87 in 1978 to 79 in 1997, a loss of 8 farms. Total direct sales in nominal dollars rose from $1.3 million to $2.1 million, a gain of $0.8 million. Average direct sales from a farm using direct marketing in Essex County were $26,867 in 1997.

Net cash returns from agricultural sales averaged $23,055 per farm in Essex County in 1997. Fifty-one percent of farms experienced net losses, a seven-percentage-point decrease from the 78 percent with losses in 1987.

Hired labor was used on 187 farms in 1997. A total of 978 workers received $5.1 million in payroll. 72 percent of employees were seasonal, with 703 working fewer than 150 days.

The average age of farmers in Essex County was 55.6 years in 1997, a slight increase from the former average of 55.1 years in 1974, and above the state average of 54.9 years. Forty-nine percent of Essex County farmers had principal occupations other than farming in 1997; an increase from the 44 percent principally employed in off-farm occupations in 1974.

Franklin County

Franklin County encompassed 9 percent of the Commonwealth's land, but included 14.5 percent of the farmland and 14.2 percent of the cropland (Table 2.6). It had 9.7 percent of the state's farms, accounting for 9 percent of Massachusetts agricultural sales (Figure 2.27).

Agriculture in Franklin County grew during the period of 1974 to 1997. There was a real dollar decrease in dairy sales, but there was a sales increase in

the group of nursery and greenhouse and in the group of tobacco (Table 2.18). Direct-to-consumer sales increased, and the number of farms using direct sales also increased (Table 2.19).

Agricultural sales in Franklin County more than doubled, from $15.1 million in 1974 to $40.7 million in 1997 (Table 2.18). The average sales per farm nearly doubled, rising from $37,438 in 1974 to $74,962 in 1997. These nominal dollar increases were also real increases in dollars adjusted by the Producer Price Index for farm products. Dairy was the largest selling commodity group in 1978. It represented 51 percent of sales from farms in the county, and remained the leader in 1997, when dairy products were 30 percent of the county's sales. Although from 1978 to 1997, dairy product sales in nominal dollars increased, dairy suffered real decreases in dollar values adjusted by the Producer Price Index. Also, the number of dairy farms decreased from 141 farms in 1978 to 79 in 1997. Second in sales was the group of nursery and greenhouse crops, increasing from 4 percent of Franklin County's total agricultural sales in 1978 to 22 percent in 1997. The number of farms producing nursery and greenhouse crops nearly quadrupled, from 29 in 1978 to 114 in 1997. Third in sales was tobacco, with 16 percent of Franklin County's total in 1997. Tobacco production made a strong recovery in Franklin County, after decreasing from 14 percent of total sales in 1978 to less than 1 percent throughout the 1980s.

Table 2.18. Agricultural product sales, Franklin County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	404	456	521	616	519	543
Total sales, ($1,000)	$15,125	$19,443	$21,555	$24,575	$30,028	$40,704
Total sales adjusted by PPI ($1,000)	$19,541	$22,170	$21,555	$25,733	$28,985	$36,085
Average sales per farm	$37,438	$42,637	$41,372	$39,895	$57,857	$74,962
Average sales per farm, adjusted by PPI	$48,370	$48,617	$41,372	$41,775	$55,847	$66,456
All crops (farms)	237	244	281	356	327	371
All crops ($1,000)	$6,586	$6,699	$6,826	$11,081	$14,910	$25,074
grains (farms)	(NA)	11	18	19	12	9
grains ($1,000)	(NA)	$15	$113	$112	(D)	$94
tobacco (farms)	(NA)	13	9	5	2	17
tobacco ($1,000)	(NA)	$2,694	$74	$162	(D)	$6,599
hay, silage, and field seeds (farms)	(NA)	137	151	205	189	169
hay, silage, and field seeds ($1,000)	(NA)	$526	$565	$820	$1,104	$1,401
vegetables, sweet corn, melons (farms)	(NA)	75	90	99	93	78
vegetables, sweet corn, melons ($1,000)	(NA)	$747	$1,663	$2,371	$2,802	$4,204
fruits, nuts, and berries (farms)	(NA)	41	51	66	72	52
fruits, nuts, and berries ($1,000	(NA)	$1,479	$2,201	$3,188	$3,428	$1,896
nursery and greenhouse crops (farms)	21	29	42	54	73	114
nursery and greenhouse crops ($1,000)	$322	$648	$1,334	$3,427	$6,048	$8,759
other crops (farms)	(NA)	26	20	24	31	103
other crops ($1,000)	(NA)	$590	$876	$1,001	$1,045	$2,121

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.18. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	261	311	344	349	297	272
All livestock ($1,000):	$8,372	$12,744	$14,729	$13,494	$15,118	$15,630
poultry and poultry products (farms)	21	36	44	46	50	30
poultry and poultry products ($1,000)	$410	$562	$268	$295	(D)	$496
dairy products (farms)	(NA)	141	138	115	99	79
dairy products ($1,000)	(NA)	$9,850	$12,445	$11,015	(D)	$12,200
cattle and calves (farms)	(NA)	260	264	251	210	200
cattle and calves ($1,000)	(NA)	$2,075	$1,626	$1,577	$1,339	$986
hogs and pigs (farms)	(NA)	29	33	44	35	21
hogs and pigs ($1,000)	(NA)	$33	$33	$78	(D)	$27
sheep, lambs, and wool (farms)	(NA)	31	58	57	57	43
sheep, lambs, and wool ($1,000)	(NA)	$14	$50	$80	(D)	$58
other livestock, livestock products (farms)	(NA)	37	57	62	52	50
other livestock, livestock products ($1,000)	(NA)	$211	$307	$451	$900	$1,863

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.19. Selected farm data for Franklin County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 181,861						
Land in farms (hectares)	29,506	32,508	32,138	33,535	30,144	30,407
Total cropland (hectares)	12,109	13,977	12,940	13,577	13,237	12,828
Irrigated land (hectares)	241	213	190	381	467	741
Average size of farm (hectares)	73	71	62	55	58	56
Farms (number)	404	456	521	616	519	543
Estimated market value, nominal dollars						
land and buildings: average per farm	$119,250	$151,880	$162,852	$244,320	$382,114	$314,595
land and buildings: average per hectare	$1,633	$2,172	$2,607	$5,164	$6,427	$5,631
machinery and equipment: average per farm		$29,513	$27,445	$26,903	$38,635	$39,432
Total farm production expenses						
($1,000 nominal)	$12,822	(NA)	(NA)	$17,700	$27,153	$32,218
average per farm (dollars)	$31,738	(NA)	(NA)	$28,734	$52,318	$59,334
Net cash return from sales						
total ($1,000 nominal)	$2,303	(NA)	(NA)	$5,688	$3,230	$7,873
average per farm (dollars)	$5,700	(NA)	(NA)	$9,235	$6,224	$14,500
number of farms with net gains	(NA)	(NA)	(NA)	296	227	284
number of farms with net losses	(NA)	(NA)	(NA)	320	292	259
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$338	$490	$448
Government payments ($1,000)	(NA)	(NA)	(NA)	$188	$179	$216
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$147	$201	$63
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$22	$110	$55

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.19. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	90	127	(NA)	121	135
total (nominal dollars in thousands)	(NA)	$348	$978	(NA)	$909	$1,746
average per farm (nominal dollars)	(NA)	3,867	7,701	(NA)	$7,515	$12,933
Operators by principal occupation						
Farming	252	281	308	313	285	275
Other	132	175	213	303	234	268
Average age of operator (years)	53.4	52.0	49.7	50.2	51.6	53.3
Operators by days worked off farm						
None	158	207	208	231	205	196
Any	173	222	277	362	296	320
200 days or more	109	132	155	232	185	190
Farm employment, hired farm labor						
farms with hired farm labor	191	250	292	(NA)	206	258
hired farm labor (number workers hired)	4,980	3,325	1,567	(NA)	1,284	1,490
hired farm labor (payroll in thousands)	$3,330	$3,419	$2,604	$3,283	$6,489	$9,257
working 150 days or more (workers)	394	683	438	(NA)	444	443
working fewer than 150 days (workers)	4,586	2,642	1,129	(NA)	840	1,047
Year 1997 top commodity group sales	nominal dollars in thousands					
dairy products	(NA)	$9,850	$12,445	$11,015	(D)	$12,200
nursery and greenhouse crops	$322	$648	$1,334	$3,427	$6,048	$8,759
tobacco	(NA)	$2,694	$74	$162	(D)	$6,599
vegetables, sweet corn, and melons	(NA)	$747	$1,663	$2,371	$2,802	$4,204

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

The number of farms, amount of farmland, and amount of cropland increased from the year 1974 to 1987 (Table 2.19), subsequently decreased, but were still larger in 1997 than in 1974. Farm numbers increased from 404 farms in 1974 to 616 in 1987, but then declined to 543 in 1997, a final differential of plus 139 farms. Similarly, there was an increase in farmland from 29,508 hectares in 1974 to 33,535 hectares in 1987 and then a decline to 30,407 hectares in 1997, an ending differential of plus 899 hectares. Cropland increased from 12,109 hectares in 1974 to 13,577 in 1987, but then declined to 12,828 hectares in 1997, a final differential of plus 719 hectares.

The number of farms engaged in direct marketing of agricultural products increased from 90 farms in 1978 to 135 in 1997, as total direct sales in nominal dollars increased from $0.3 million to $1.7 million. Average direct sales from farms using direct marketing in Franklin County were $12,933 in 1997.

Net cash returns from agricultural sales averaged $14,500 per farm in Franklin County in 1997. Forty-eight percent of farms experienced net losses in 1997, a four-percentage-point decrease from the 52 percent with losses in 1987.

Hired labor was used on 258 farms in 1997. A total of 1,490 workers received $9.3 million in payroll. Most employees, 70 percent, were seasonal, with 1,047 working fewer than 150 days.

The average age of farmers in Franklin County was 53 years in 1997, unchanged from the average in 1974, and below the state average of 54.9 years. Fifty percent of Franklin County farmers had principal occupations other than farming in 1997, while only 34 percent were principally employed in off-farm occupations in 1974.

Hampden County

Hampden County encompassed 7.9 percent of the Commonwealth's land, including 7.2 percent of the farmland and 7.2 percent of the cropland (Table 2.6). It had 7.5 percent of the state's farms, accounting for 6.4 percent of Massachusetts agricultural sales (Figure 2.27).

Hampden County's agriculture increased in the number of farms and farm product sales (Table 2.20) but lost farmland and cropland from 1974 to 1997 (Table 2.21). While there were losses in dairy, there was an increase in nursery and greenhouse production. Agriculture remained diversified, with losses in the livestock sector offset by increased crop sales. Direct-to-consumer sales increased, even though the number of farms using direct sales decreased.

The number of farms in Hampden County increased, while farmland and cropland were lost from 1974 to 1997. The number of farms increased from 311 farms in 1974 to 490 in 1987, but then declined to 418 farms in 1997, a final

Table 2.20. Agricultural product sales, Hampden County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	311	367	392	490	410	418
Total sales, ($1,000)	$13,595	$14,179	$15,572	$19,056	$18,947	$29,107
Total sales adjusted by PPI ($1,000)	$17,565	$16,168	$15,572	$19,954	$18,289	$25,804
Average sales per farm	$43,714	$38,635	$39,724	$38,889	$46,211	$69,633
Average sales per farm, adjusted by PPI	$56,478	$44,054	$39,724	$40,721	$44,605	$61,731
All crops (farms)	214	224	220	288	247	298
All crops ($1,000)	$9,051	$8,893	$8,758	$13,357	$13,832	$24,986
grains (farms)	(NA)	8	5	6	7	4
grains ($1,000)	(NA)	$17	$6	(D)	$24	(D)
tobacco (farms)	(NA)	8	6	5	8	10
tobacco ($1,000)	(NA)	$2,746	$1,489	$2,540	(D)	(D)
hay, silage, and field seeds (farms)	(NA)	66	89	135	102	123
hay, silage, and field seeds ($1,000)	(NA)	(D)	$323	$476	$561	$821
vegetables, sweet corn, melons (farms)	(NA)	76	73	76	70	66
vegetables, sweet corn, melons ($1,000)	(NA)	$1,900	$2,634	$2,764	$1,890	$3,255
fruits, nuts, and berries (farms)	(NA)	69	68	70	59	60
fruits, nuts, and berries ($1,000	(NA)	$1,253	$1,728	$1,578	$1,959	$2,041
nursery and greenhouse crops (farms)	57	78	56	72	69	121
nursery and greenhouse crops ($1,000)	$1,771	$2,434	(D)	$5,660	$5,277	$8,400
other crops (farms)	(NA)	9	8	8	2	13
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	$89

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

(continued on next page)

Table 2.20. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	162	190	211	221	178	142
All livestock ($1,000):	$4,495	$5,286	$6,814	$5,698	$5,114	$4,120
poultry and poultry products (farms)	22	23	30	38	27	24
poultry and poultry products ($1,000)	$760	$740	$858	$904	$765	(D)
dairy products (farms)	(NA)	64	72	41	37	22
dairy products ($1,000)	(NA)	$3,577	$5,143	$4,023	$3,670	(D)
cattle and calves (farms)	(NA)	128	147	134	97	76
cattle and calves ($1,000)	(NA)	$574	$642	$616	$460	$245
hogs and pigs (farms)	(NA)	25	18	25	18	15
hogs and pigs ($1,000)	(NA)	$324	$46	$31	$82	$97
sheep, lambs, and wool (farms)	(NA)	14	21	31	30	25
sheep, lambs, and wool ($1,000)	(NA)	$14	$25	$19	$28	$18
other livestock, livestock products (farms)	(NA)	35	28	50	42	36
other livestock, livestock products ($1,000)	(NA)	$56	$99	$105	$109	$104

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.21. Selected farm data for Hampden County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 160,201						
Land in farms (hectares)	17,047	17,577	17,740	18,919	15,167	15,143
Total cropland (hectares)	7,474	7,991	7,565	7,518	6,090	6,521
Irrigated land (hectares)	588	356	371	324	280	443
Average size of farm (hectares)	55	48	45	38	37	36
Farms (number)	311	367	392	490	410	418
Estimated market value, nominal dollars						
land and buildings: average per farm	$114,141	$161,856	$180,747	$283,605	$295,835	$357,644
land and buildings: average per hectare	$2,083	$3,393	$4,764	$7,213	$8,092	$11,408
machinery and equipment: average per farm	$21,272	$23,561	$25,136	$29,365	$27,033	$28,543
Total farm production expenses						
($1,000 nominal)	$11,167	(NA)	(NA)	$15,823	$15,559	$21,535
average per farm (dollars)	$35,907	(NA)	(NA)	$32,227	$38,042	$51,519
Net cash return from sales						
total ($1,000 nominal)	$2,428	(NA)	(NA)	$4,128	$2,585	$6,511
average per farm (dollars)	$7,807	(NA)	(NA)	$8,407	$6,319	$15,576
number of farms with net gains	(NA)	(NA)	(NA)	244	182	179
number of farms with net losses	(NA)	(NA)	(NA)	247	227	239
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$155	$137	$194
Government payments ($1,000)	(NA)	(NA)	(NA)	$13	$140	$57
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$46	$59	$173
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$6	$13	$31

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

(Continued on next page)

Table 2.21. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	80	108	(NA)	93	102
total (nominal dollars in thousands)	(NA)	$615	$1,582	(NA)	$1,009	$1,409
average per farm (nominal dollars)	(NA)	7,688	14,648	(NA)	$10,847	$13,811
Operators by principal occupation						
Farming	202	205	199	248	215	209
Other	93	162	193	242	195	209
Average age of operator (years)	54.6	53.9	53.2	54.7	55.4	56.7
Operators by days worked off farm						
None	140	163	147	197	184	165
Any	117	190	218	278	202	220
200 days or more	66	116	158	186	145	148
Farm employment, hired farm labor						
farms with hired farm labor	138	197	189	(NA)	118	159
hired farm labor (number workers hired)	3,634	2,900	1,530	(NA)	1,232	1,406
hired farm labor (payroll in thousands)	$3,326	$3,334	$2,419	$4,754	$4,395	$7,152
working 150 days or more (workers)	342	504	334	(NA)	265	437
working fewer than 150 days (workers)	3,292	2,396	1,196	(NA)	967	969
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$1,771	$2,434	(D)	$5,660	$5,277	$8,400
vegetables, sweet corn, and melons	(NA)	$1,900	$2,634	$2,764	$1,890	$3,255
fruits, nuts, and berries	(NA)	$1,253	$1,728	$1,578	$1,959	$2,041
hay, silage, and field seeds	(NA)	(D)	$323	$476	$561	$821

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

differential of plus 107 farms. In contrast, there was an initial increase in farmland from 17,047 hectares in 1974 to 18,919 hectares in 1987 but then a decline to 15,143 hectares in 1997, a final differential of minus 1,904 hectares. Cropland also initially increased from 7,474 hectares in 1974 to 7,991 in 1978 but then declined to 6,521 hectares in 1997, an ending differential of minus 953 hectares.

Hampden County's agricultural sales in 1997 nearly doubled, from $13.6 million in 1974 to $29.1 million. Average sales per farm also increased, rising from $43,714 in 1974 to $69,633 in 1997, a gain of $25,919 per farm. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.21).

Hampden County's major commodity group in 1997 was nursery and greenhouse crops, with sales of $8.4 million. Sales of this group almost doubled from 13 percent of the county's agricultural sales in 1974 to 29 percent in 1997. The second commodity group in 1997, dairy, declined from providing 25 percent of the county's agricultural sales in 1978 to 19 percent in 1992. The number of dairy farms fell by almost two-thirds, from 64 in 1978 to only 22 in 1997. The third commodity group in sales was vegetables, sweet corn, and melons, which provided 11 percent of total sales in 1997. Fruits, nuts, and berries sales increased to achieve 7 percent of overall sales in 1997. Tobacco production expanded, with the number of farms selling tobacco doubling from 5 to 10 over

the ten-year period from 1987 to 1997. Livestock sales of cattle, calves, hogs, and pigs declined, from a total of 6 percent of agricultural sales in 1978 to only 1 percent in 1997.

The number of farms engaged in direct marketing of agricultural products increased from 80 farms in 1978 to 102 in 1997, with total direct sales rising from $0.6 million to $1.4 million in nominal dollars. Average direct sales from farms using direct marketing in Hampden County were $13,811 in 1997.

Net cash returns averaged $15,576 per farm in Hampden County in 1997. Fifty-seven percent of farms had net losses in 1997, a seven-percentage-point increase from the 50 percent of farms with losses in 1987.

Hired labor was used on 159 farms in 1997. A total of 1,406 workers received $7.1 million in payroll. Most employees, 69 percent, were seasonal, with 969 working fewer than 150 days.

In 1997, the average age of farmers in Hampden County was 56.7 years, up from the 1974 average of 54.6, and above the state average for 1997 of 54.9 years. Fifty percent of Hampden County farmers had principal occupations other than farming in 1997, while only 31 percent were principally employed in off-farm occupations in 1974.

Hampshire County

Agriculture was very important in Hampshire County. While the county encompassed 6.7 percent of the Commonwealth's land area, it had 10 percent of the farmland, 12 percent of the cropland (Table 2.6), and 9.7 percent of the state's farms, accounting for 7.8 percent of Massachusetts agricultural sales (Figure 2.27).

From 1974 to 1997, Hampshire County increased the number of its farms and its farm product sales (Table 2.22), despite losses of farmland and cropland (Table 2.23). While there were losses in dairy, there was an increase in nursery and greenhouse crops sales and in tobacco production. Direct-to-consumer sales and the number of farms using direct sales increased.

In Hampshire County, the number of farms increased from 495 farms in 1974 to 624 in 1987 but then declined to 539 farms in 1997, a differential of plus 44 farms. Farmland declined from 26,261 hectares in 1974 to 21,635 hectares in 1997, a decrease of 4,625 hectares. Cropland declined from 13,623 hectares in 1974 to 10,872 hectares in 1997, a decrease of 2,751 hectares.

Hampshire County's agricultural sales were $18.2 million in 1974 and $35.5 million in 1997, an increase of $17.3 million. Average agricultural sales per farm were $36,808 in 1974 and $65,888 in 1997, an increase of $29,080. These

Table 2.22. Agricultural product sales, Hampshire County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	495	493	559	624	527	539
Total sales, ($1,000)	$18,220	$21,741	$25,483	$27,532	$24,794	$35,514
Total sales adjusted by PPI ($1,000)	$23,540	$24,790	$25,483	$28,829	$23,932	$31,484
Average sales per farm	$36,808	$44,100	$45,586	$44,122	$47,048	$65,888
Average sales per farm, adjusted by PPI	$47,556	$50,285	$45,586	$46,201	$45,413	$58,411
All crops (farms)	367	327	332	387	356	395
All crops ($1,000)	$8,900	$9,750	$9,908	$15,957	$15,499	$25,130
grains (farms)	(NA)	30	33	24	23	19
grains ($1,000)	(NA)	$203	$478	$384	$556	$663
tobacco (farms)	(NA)	23	31	11	17	40
tobacco ($1,000)	(NA)	$1,545	$931	$1,886	$2,337	$6,835
hay, silage, and field seeds (farms)	(NA)	129	142	184	163	154
hay, silage, and field seeds ($1,000)	(NA)	$373	$495	$582	$906	$883
vegetables, sweet corn, melons (farms)	(NA)	150	134	136	135	124
vegetables, sweet corn, melons ($1,000)	(NA)	$1,876	$2,165	$3,483	$3,326	$5,816
fruits, nuts, and berries (farms)	(NA)	53	46	60	72	51
fruits, nuts, and berries ($1,000	(NA)	$1,264	$1,222	$1,365	$1,494	$957
nursery and greenhouse crops (farms)	40	44	42	60	58	112
nursery and greenhouse crops ($1,000)	$2,226	$2,409	$2,397	$5,621	$3,851	$5,317
other crops (farms)	(NA)	41	38	29	33	71
other crops ($1,000)	(NA)	$2,080	$2,221	$2,637	$3,028	$4,658

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.2. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	245	248	300	295	232	198
All livestock ($1,000):	$9,263	$11,991	$15,574	$11,575	$9,295	$10,384
poultry and poultry products (farms)	33	36	44	30	38	26
poultry and poultry products ($1,000)	$2,845	$2,886	$3,462	$186	$219	$372
dairy products (farms)	(NA)	114	123	80	60	43
dairy products ($1,000)	(NA)	$7,369	$10,045	$9,246	$7,273	$7,038
cattle and calves (farms)	(NA)	198	218	208	160	125
cattle and calves ($1,000)	(NA)	$1,220	$1,373	$1,135	$1,122	$640
hogs and pigs (farms)	(NA)	32	38	20	23	17
hogs and pigs ($1,000)	(NA)	$414	$454	$450	$458	$435
sheep, lambs, and wool (farms)	(NA)	19	38	54	39	34
sheep, lambs, and wool ($1,000)	(NA)	$51	$76	$235	$111	$100
other livestock, livestock products (farms)	(NA)	32	50	53	44	46
other livestock, livestock products ($1,000)	(NA)	$51	$164	$323	$113	$1,798

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.23. Selected farm data for Hampshire County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 137,023						
Land in farms (hectares)	26,261	24,765	25,749	26,130	21,635	21,082
Total cropland (hectares)	13,623	13,186	13,939	13,802	12,114	10,872
Irrigated land (hectares)	203	118	154	182	(D)	282
Average size of farm (hectares)	53	50	46	42	41	39
Farms (number)	495	493	559	624	527	539
Estimated market value, nominal dollars						
land and buildings: average per farm	$97,166	$137,966	$156,487	$259,069	$325,006	$302,304
land and buildings: average per hectare	$1,831	$2,713	$3,929	$6,427	$9,516	$9,535
machinery and equipment: average per farm	$20,440	$27,054	$30,738	$28,932	$32,839	$36,035
Total farm production expenses						
($1,000 nominal)	$15,715	(NA)	(NA)	$21,234	$19,857	$25,744
average per farm (dollars)	$31,747	(NA)	(NA)	$34,083	$37,751	$47,763
Net cash return from sales						
total ($1,000 nominal)	$2,505	(NA)	(NA)	$5,076	$4,052	$8,874
average per farm (dollars)	$5,061	(NA)	(NA)	$8,147	$7,704	$16,465
number of farms with net gains	(NA)	(NA)	(NA)	291	239	282
number of farms with net losses	(NA)	(NA)	(NA)	332	287	257
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$272	$235	$65
Government payments ($1,000)	(NA)	(NA)	(NA)	$146	$171	$151
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$265	$60	$75
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$29	$58	$81

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.23. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	115	125	(NA)	114	127
total (nominal dollars in thousands)	(NA)	$966	$647	(NA)	$663	$1,562
average per farm (nominal dollars)	(NA)	8,400	5,176	(NA)	$5,818	$12,303
Operators by principal occupation						
Farming	294	297	337	307	280	278
Other	181	196	222	317	247	261
Average age of operator (years)	55.8	53.9	52.3	54.0	53.7	54.4
Operators by days worked off farm						
None	181	232	224	240	214	226
Any	226	245	287	350	285	295
200 days or more	121	161	172	235	171	185
Farm employment, hired farm labor						
farms with hired farm labor	211	262	261	(NA)	193	201
hired farm labor (number workers hired)	2,803	2,798	2,034	(NA)	1,507	1,554
hired farm labor (payroll in thousands)	$2,754	$3,772	$3,379	$5,034	$5,215	$6,198
working 150 days or more (workers)	364	616	475	(NA)	250	314
working fewer than 150 days (workers)	2,439	2,182	1,559	(NA)	1,257	1,240
Year 1997 top commodity group sales	nominal dollars in thousands					
dairy products	(NA)	$7,369	$10,045	$9,246	$7,273	$7,038
tobacco	(NA)	$1,545	$931	$1,886	$2,337	$6,835
vegetables, sweet corn, and melons	(NA)	$1,876	$2,165	$3,483	$3,326	$5,816
nursery and greenhouse crops	$2,226	$2,409	$2,397	$5,621	$3,851	$5,317

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.22).

The major commodity group of Hampshire County was dairy in 1997, with $7.0 million in sales. These sales represented 20 percent of the county's farm product sales, but a decline from 35 percent of the county's sales in 1978. The number of dairy farms also decreased, from 114 farms in 1978 to 43 in 1997, a loss of 71 farms. Tobacco was the second largest selling commodity, with 19 percent of sales. The third commodity group, vegetables, sweet corn, and melons, had 16 percent of total sales and the fourth commodity group, nursery and greenhouse crops, had 15 percent of overall sales. Each of these categories had rapid growth in sales from 1978 to 1997, whereas dairy declined in sales by 15 percentage points.

The number of farms using direct marketing to sell agricultural products increased from 115 farms in 1978 to 127 in 1997, an increase of 12 farms, with total direct sales rising from $0.9 million to $1.6 million. Average direct sales from farms using direct marketing in Hampshire County were $12,303 in 1997.

Net cash returns in 1997 were $16,465 per farm in Hampshire County. Forty-eight percent of farms experienced net losses in 1997, a five-percentage-point decrease from the 53 percent of farms with losses in 1987.

Hired labor was used on 201 farms in 1997. A total of 1,554 workers received $6.2 million in payroll. Most employees were seasonal, with 1,240 (80 percent) working fewer than 150 days.

In 1997, the average age of farmers in Hampshire County was 54.4 years, down from the 1974 average of 55.8 years, and slightly below the state average in 1997 of 54.9 years. Forty-eight percent of Hampshire County farmers had principal occupations other than farming in 1997, while only 38 percent were principally employed in off-farm occupations in 1974.

Middlesex County

A relatively small portion of Middlesex County's land was in agriculture, but the county had its fair share of farms and farm product sales. Middlesex County encompassed 10.5 percent of the Commonwealth's land but only 5.9 percent of Massachusetts farmland and 6.8 percent of cropland (Table 2.6). Middlesex had 9.5 percent of the state's farms, accounting for 12.7 percent of Massachusetts agricultural sales (Figure 2.27).

Middlesex County agriculture grew in numbers of farms and sales of farm products (Table 2.24) but lost farmland and cropland (Table 2.25) from 1974 to 1997. Livestock declined in sales, while the category of nursery and greenhouse crops and the category of vegetables, sweet corn, and melons increased sales.

Table 2.24. Agricultural product sales, Middlesex County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	504	574	567	569	535	531
Total sales, ($1,000)	$37,642	$41,016	$45,543	$49,860	$44,882	$57,572
Total sales adjusted by PPI ($1,000)	$48,633	$46,769	$45,543	$52,209	$43,322	$51,039
Average sales per farm	$74,687	$71,457	$80,324	$87,628	$83,892	$108,421
Average sales per farm, adjusted by PPI	$96,495	$81,479	$80,324	$91,757	$80,977	$96,118
All crops (farms)	397	382	370	374	372	403
All crops ($1,000)	$23,699	$20,437	$24,114	$28,964	$34,735	$49,788
grains (farms)	(NA)	(D)	3	5	4	8
grains ($1,000)	(NA)	$0	$0	$23	$4	$24
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	124	125	145	136	142
hay, silage, and field seeds ($1,000)	(NA)	$619	$889	$923	$1,339	$1,012
vegetables, sweet corn, melons (farms)	(NA)	125	139	127	136	138
vegetables, sweet corn, melons ($1,000)	(NA)	$2,081	$3,158	$3,432	$3,861	$5,266
fruits, nuts, and berries (farms)	(NA)	69	79	80	84	76
fruits, nuts, and berries ($1,000	(NA)	$1,762	$2,054	(D)	$2,348	$2,193
nursery and greenhouse crops (farms)	151	149	125	120	139	184
nursery and greenhouse crops ($1,000)	$18,450	$15,952	$18,007	$22,597	$27,169	$41,250
other crops (farms)	(NA)	14	5	4	8	14
other crops ($1,000)	(NA)	$24	(D)	(D)	$15	$43

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.24. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	221	264	269	250	196	164
All livestock ($1,000):	$13,836	$20,579	$21,429	$20,896	$10,147	$7,783
poultry and poultry products (farms)	55	69	66	54	47	40
poultry and poultry products ($1,000)	$4,915	$2,968	$2,500	$1,489	$699	$400
dairy products (farms)	(NA)	51	38	24	19	10
dairy products ($1,000)	(NA)	$2,934	$2,761	$2,833	$2,497	$2,082
cattle and calves (farms)	(NA)	142	124	106	78	69
cattle and calves ($1,000)	(NA)	$732	(D)	$836	$762	$500
hogs and pigs (farms)	(NA)	60	55	50	27	30
hogs and pigs ($1,000)	(NA)	$1,450	$1,133	$1,347	$261	$522
sheep, lambs, and wool (farms)	(NA)	33	41	59	53	38
sheep, lambs, and wool ($1,000)	(NA)	$26	$55	(D)	$60	$39
other livestock, livestock products (farms)	(NA)	54	76	79	76	58
other livestock, livestock products ($1,000)	(NA)	$12,469	(D)	(D)	$5,869	$4,241

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.25. Selected farm data for Middlesex County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 213,305						
Land in farms (hectares)	17,392	16,807	16,258	15,666	12,782	12,432
Total cropland (hectares)	9,033	9,361	8,005	8,202	7,287	6,173
Irrigated land (hectares)	661	518	418	507	536	642
Average size of farm (hectares)	34	29	29	28	24	23
Farms (number)	504	574	567	569	535	531
Estimated market value, nominal dollars						
land and buildings: average per farm	$167,381	$256,638	$264,041	$313,826	$402,629	$503,318
land and buildings: average per hectare	$4,851	$7,737	$10,788	$12,256	$18,895	$24,122
machinery and equipment: average per farm	$25,114	$23,273	$34,265	$34,291	$31,731	$40,939
Total farm production expenses						
($1,000 nominal)	$33,409	(NA)	(NA)	$39,445	$31,243	$36,251
average per farm (dollars)	$66,288	(NA)	(NA)	$69,202	$58,398	$68,269
Net cash return from sales						
total ($1,000 nominal)	$4,233	(NA)	(NA)	$9,469	$11,139	$22,468
average per farm (dollars)	$8,399	(NA)	(NA)	$16,612	$20,820	$42,312
number of farms with net gains	(NA)	(NA)	(NA)	318	256	226
number of farms with net losses	(NA)	(NA)	(NA)	252	279	305
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$215	$174	$196
Government payments ($1,000)	(NA)	(NA)	(NA)	$50	$125	$67
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$323	$178	$403
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$66	$8	$91

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.25. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	128	170	(NA)	130	150
total (nominal dollars in thousands)	(NA)	$1,173	$2,972	(NA)	$2,122	$2,905
average per farm (nominal dollars)	(NA)	9,164	17,482	(NA)	$16,320	$19,369
Operators by principal occupation						
Farming	258	329	313	290	292	283
Other	174	245	254	279	243	248
Average age of operator (years)	53.4	51.7	51.9	52.6	54.4	55.1
Operators by days worked off farm						
None	174	270	247	206	235	243
Any	179	278	291	324	260	257
200 days or more	119	174	180	184	156	161
Farm employment, hired farm labor						
farms with hired farm labor	244	320	218	(NA)	158	278
hired farm labor (number workers hired)	3,397	3,330	2,941	(NA)	1,260	1,940
hired farm labor (payroll in thousands)	$7,951	$11,518	$12,612	$14,911	$12,409	$11,192
working 150 days or more (workers)	1,196	1,260	1,156	(NA)	622	584
working fewer than 150 days (workers)	2,201	2,070	1,785	(NA)	638	1,356
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$18,450	$15,952	$18,007	$22,597	$27,169	$41,250
vegetables, sweet corn, and melons	(NA)	$2,081	$3,158	$3,432	$3,861	$5,266
other livestock and livestock products	(NA)	$12,469	(D)	(D)	$5,869	$4,241
fruits, nuts, and berries	(NA)	$1,762	$2,054	(D)	$2,348	$2,193
dairy products	(NA)	$2,934	$2,761	$2,833	$2,497	$2,082

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

There were 504 farms in Middlesex County in 1974 and 569 in 1987, an increase of 65 farms, but subsequently there was a decline in numbers to 531 farms in 1997, a final differential decrease of 27 farms. Both farmland and cropland decreased from 1974 to 1997. Farmland decreased from 17,392 hectares in 1974 to 12,432 hectares in 1997, a loss of 4,960 hectares. Cropland decreased from 9,033 hectares in 1974 to 6,173 hectares in 1997, a loss of 2,860 hectares.

Farm product sales in Middlesex County increased from $37.6 million in 1974 to $57.6 million in 1997, a gain of $20 million. The average sales per farm increased from $74,687 in 1974 to $108,421 in 1997, a gain of $33,734 per farm. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products.

In 1997, the major commodity group in Middlesex County was nursery and greenhouse crops, with sales of $41.2 million. Nursery and greenhouse crop sales as a proportion of the county's total sales, almost doubled from 39 percent of the county's total sales in 1974 to 72 percent of sales in 1997. Second was the group of vegetables, sweet corn, and melons, with 9 percent of the county's sales in 1997. Third was the group of fruit, nuts and berries at 4 percent of the total. The group of dairy was a close fourth in 1997, with sales at less than 4 percent, down from 7 percent in 1978. The number of dairy farms decreased from 51 farms in 1978 to only 10 in 1997. Large losses also occurred in the other

livestock categories. In 1978, the category of poultry provided 7 percent of sales, the category of hogs and pigs contributed 4 percent, and the category of cattle and calves provided 2 percent, but each represented less than 1 percent of sales in 1997.

The number of farms using direct marketing to sell agricultural products increased from 128 farms in 1978 to 150 in 1997, a gain of 22 farms, with total direct sales in nominal dollars increasing from $1.2 million to $2.9 million. Average direct sales from farms using direct marketing in Middlesex County were $19,369 in 1997.

Net cash returns averaged $42,312 per farm in Middlesex County in 1997. Fifty-seven percent of farms had net losses in 1997, an increase over the 44 percent of farms with losses in 1987.

Hired labor was used on 278 farms in 1997. A total of 1,940 workers received $11.2 million in payroll. Most employees were seasonal, with 1,356 (70 percent) working fewer than 150 days.

In 1997, the average age of farmers in Middlesex County was 55.1 years, up from the 1974 average of 53.4 years, and slightly above the state average in 1997 of 54.9 years. Forty-seven percent of Middlesex County farmers had

principal occupations other than farming in 1997, while only 40 percent had been principally employed in off farm employment in 1974.

Nantucket County

Nantucket County is a relatively small county in Massachusetts, which makes a modest contribution to the states agricultural economy. Nantucket County had 0.6 percent of the Commonwealth's land, including 2 percent of the farmland (Table 2.6). It had 0.25 percent of the farms and 0.65 percent of Massachusetts agricultural sales (Figure 2.26).

Agriculture in Nantucket County increased in the number of its farms, amount of sales, and amount of cropland (Table 2.27) from 1974 to 1997. Land was more intensively managed, contributing to a sales increase of 800 percent. Almost all Nantucket farmers were full-time farmers in 1997.

From 1974 to 1997, Nantucket County had increases in the number of its farms and the amount of cropland, while the amount of total farmland remained unchanged. The number of farms more than doubled, from 6 farms in 1974 to 14 in 1997. Cropland increased from 112 hectares in 1974 to 210 hectares in 1987, an increase of 98 hectares. Irrigated land increased from 87 hectares in 1974 to 134 hectares in 1997, an increase of 47 hectares. Farmland was 423 hectares in 1974 and 425 hectares in 1997.

Table 2.26. Agricultural product sales, Nantucket County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms		9	6	12	14	14
Total sales, ($1,000)	$152	$249	$327	$2,141	D	$2,951
Total sales adjusted by PPI ($1,000)	$196	$284	$327	$2,242		$2,616
Average sales per farm	$25,333	$27,704	$54,538	$178,456	D	$210,821
Average sales per farm, adjusted by PPI	$32,730	$31,590	$54,538	$186,865		$186,898
All crops (farms)	6	8	6	10	12	13
All crops ($1,000)	$150	(D)	(D)	$2,137	(D)	$2,951
grains (farms)	(NA)	0	0	0	0	0
grains ($1,000)	(NA)	$0	$0	$0	$0	$0
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	3	2	0	1	1
hay, silage, and field seeds ($1,000)	(NA)	$10	(D)	$0	(D)	(D)
vegetables, sweet corn, melons (farms)	(NA)	4	3	4	3	4
vegetables, sweet corn, melons ($1,000)	(NA)	(D)	$180	(D)	(D)	(D)
fruits, nuts, and berries (farms)	(NA)	4	3	5	5	3
fruits, nuts, and berries ($1,000	(NA)	(D)	(D)	(D)	(D)	(D)
nursery and greenhouse crops (farms)	1	3	4	6	9	12
nursery and greenhouse crops ($1,000)	$26	(D)	(D)	$332	(D)	$1,063
other crops (farms)	(NA)	2	2	2	1	1
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	(D)

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.26. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	3	4	3	4	1	0
All livestock ($1,000):	$2	(D)	(D)	(D)	(D)	$0
poultry and poultry products (farms)	2	0	1	1	0	0
poultry and poultry products ($1,000)	(D)	$0	(D)	(D)	$0	$0
dairy products (farms)	(NA)	0	0	0	0	0
dairy products ($1,000)	(NA)	$0	$0	$0	$0	$0
cattle and calves (farms)	(NA)	1	1	1	0	0
cattle and calves ($1,000)	(NA)	(D)	(D)	(D)	$0	$0
hogs and pigs (farms)	(NA)	0	0	0	0	0
hogs and pigs ($1,000)	(NA)	$0	$0	$0	$0	$0
sheep, lambs, and wool (farms)	(NA)	0	0	0	0	0
sheep, lambs, and wool ($1,000)	(NA)	(D)	$1	$0	$0	$0
other livestock, livestock products (farms)	(NA)	2	1	2	1	0
other livestock, livestock products ($1,000)	(NA)	(D)	(D)	(D)	(D)	$0

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.27. Selected farm data for Nantucket County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 12,376						
Land in farms (hectares)	423	656	(D)	(D)	(D)	425
Total cropland (hectares)	112	(D)	130	210	(D)	(D)
Irrigated land (hectares)	87	79	45	178	163	134
Average size of farm (hectares)	70	73	(D)	(D)	(D)	30
Farms (number)	6	9	6	12	14	14
Estimated market value, nominal dollars						
land and buildings: average per farm	$382,785	$535,889	$349,500	(D)	(D)	$680,147
land and buildings: average per hectare	$5,436	$7,356	$13,966	(D)	(D)	$22,429
machinery and equipment: average per farm	$25,200	$30,056	$59,000	$38,683	(D)	$66,500
Total farm production expenses						
($1,000 nominal)	$142	(NA)	(NA)	$1,926	(D)	$2,956
average per farm (dollars)	$23,667	(NA)	(NA)	$160,514	(D)	$211,150
Net cash return from sales						
total ($1,000 nominal)	$10	(NA)	(NA)	(D)	(D)	$5
average per farm (dollars)	$1,667	(NA)	(NA)	(D)	(D)	$329
number of farms with net gains	(NA)	(NA)	(NA)	6	3	8
number of farms with net losses	(NA)	(NA)	(NA)	6	11	6
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	(D)	$0	$0
Government payments ($1,000)	(NA)	(NA)	(NA)	(D)	$3	$0
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	(D)	$29	(D)
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	(D)	(D)	$0

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.27. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	2	2	(NA)	4	4
total (nominal dollars in thousands)	(NA)	(D)	(D)	(NA)	(D)	(D)
average per farm (nominal dollars)	(NA)	(D)	(D)	(NA)	(D)	(D)
Operators by principal occupation						
Farming	3	4	4	7	12	13
Other	2	5	2	5	2	1
Average age of operator (years)	39.6	50.7	51.5	44.8	(D)	43.6
Operators by days worked off farm						
None	2	3	1	2	4	8
Any	3	6	3	9	9	6
200 days or more	0	2	1	3	2	0
Farm employment, hired farm labor						
farms with hired farm labor	4	6	3	(NA)	8	10
hired farm labor (number workers hired)	(NA)	48	26	(NA)	(D)	129
hired farm labor (payroll in thousands)	$53	$65	(D)	(D)	(D)	$1,001
working 150 days or more (workers)	(NA)	13	(D)	(NA)	(D)	(D)
working fewer than 150 days (workers)	(NA)	35	(D)	(NA)	76	(D)
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$26	(D)	(D)	$332	(D)	$1,063

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

Agricultural sales in Nantucket County increased from $152,000 in 1974 to $3 million in 1997. The average sales per farm also increased dramatically, rising from $25,333 in 1974 to $210,821 in 1997. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.26). The major commodity group in Nantucket County was nursery and greenhouse crops, sold by 12 farms in 1997. Nursery and greenhouse crops were 17 percent of county sales in 1974 and 36 percent in 1997, a gain of 19 percentage-points. Vegetables, sweet corn, and melons were grown on four farms and fruits, nuts, and berries were produced on 3 farms in 1997. No livestock sales were reported in 1997. Four farms engaged in direct marketing of agricultural products in 1997.

Net cash returns from agricultural sales averaged only $329 per farm in Nantucket County in 1997. Forty-three percent of farms had net losses in 1997, down seven percentage-points from the fifty percent having losses in 1987. Hired farm labor was used on 10 farms in 1997. A total of 129 workers received $1 million in payroll.

In 1997, the average age of farmers in Nantucket County was 43.6 years. This average age was slightly higher than the average of 39.6 years in 1974, but lower than the 51.5 years reported in 1982, and lower than the state average in 1997 of 54.9 years. Only seven percent of Nantucket County farmers had principal occupations other than farming in 1997.

Norfolk County

Agriculture was not as important in Norfolk County as it was in other Massachusetts counties. Norfolk County included 5.1 percent of the Commonwealth's land, but only 1.9 percent of the farmland and 1.7 percent of the cropland (Table 2.6). It had 3.3 percent of the state's farms, accounting for 1.8 percent of agricultural sales (Figure 2.27).

From 1974 to 1997, the number of farms and sales of farm products (Table 2.28) increased in Norfolk County, but farmland and cropland were lost (Table 2.29). Agriculture remained diversified, but suffered real losses among all sectors. Direct-to-consumer sales increased.

Norfolk County had an increase in the number of its farms from 172 in 1974 to 212 in 1987, an increase of 40 farms, but then had a decrease in the number of farms that brought down the number to 185 in 1997, an ending differential gain of only 13 farms. The amount of farmland increased from 4,842 hectares in 1974 to 5,671 hectares in 1978, a gain of 829 hectares, but then declined to 3,994 hectares in 1997, an ending differential loss of 848 hectares. Cropland increased from 1,907 hectares in 1974 to 2,658 hectares in 1987, a gain of 751 hectares, but then declined to 1,561 in 1997, a final differential loss of 346 hectares.

Table 2.28. Agricultural product sales, Norfolk County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	172	203	205	212	186	185
Total sales, ($1,000)	$5,130	$5,829	$9,121	$13,240	$8,928	$8,266
Total sales adjusted by PPI ($1,000)	$6,628	$6,647	$9,121	$13,864	$8,618	$7,328
Average sales per farm	$29,826	$28,714	$44,494	$62,454	$48,002	$44,680
Average sales per farm, adjusted by PPI	$38,535	$32,741	$44,494	$65,397	$46,334	$39,610
All crops (farms)	107	136	132	129	122	120
All crops ($1,000)	$3,153	$4,253	$5,941	$9,044	$7,456	$7,340
grains (farms)	(NA)	1	2	1	0	0
grains ($1,000)	(NA)	(D)	(D)	(D)	$0	$0
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	35	45	47	40	33
hay, silage, and field seeds ($1,000)	(NA)	$109	$122	$208	$191	$163
vegetables, sweet corn, melons (farms)	(NA)	34	31	36	28	40
vegetables, sweet corn, melons ($1,000)	(NA)	$330	$361	$694	$635	$1,139
fruits, nuts, and berries (farms)	(NA)	15	21	28	16	19
fruits, nuts, and berries ($1,000	(NA)	$68	$417	$470	(D)	$502
nursery and greenhouse crops (farms)	56	77	63	54	63	64
nursery and greenhouse crops ($1,000)	$2,744	$3,733	$5,030	$7,649	$6,259	$5,533
other crops (farms)	(NA)	5	4	3	1	4
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	$3

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.28. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	93	85	98	101	79	70
All livestock ($1,000):	$1,958	$1,576	$3,180	$4,196	$1,473	$926
poultry and poultry products (farms)	32	20	26	27	21	18
poultry and poultry products ($1,000)	$618	$324	$358	$155	$91	$74
dairy products (farms)	(NA)	21	16	16	12	10
dairy products ($1,000)	(NA)	$912	$705	$648	$785	$589
cattle and calves (farms)	(NA)	40	50	43	37	34
cattle and calves ($1,000)	(NA)	$179	(D)	$168	$323	$90
hogs and pigs (farms)	(NA)	13	16	11	15	11
hogs and pigs ($1,000)	(NA)	$105	$151	(D)	$140	$75
sheep, lambs, and wool (farms)	(NA)	18	14	27	24	18
sheep, lambs, and wool ($1,000)	(NA)	$17	$28	$44	$36	$27
other livestock, livestock products (farms)	(NA)	21	27	42	30	19
other livestock, livestock products ($1,000)	(NA)	$39	(D)	(D)	$98	$71

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.29. Selected farm data for Norfolk County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 103,500						
Land in farms (hectares)	4,842	5,671	5,422	5,311	3,999	3,994
Total cropland (hectares)	1,907	2,273	2,155	2,658	1,876	1,561
Irrigated land (hectares)	156	104	190	137	108	135
Average size of farm (hectares)	28	28	26	25	21	21
Farms (number)	172	203	205	212	186	185
Estimated market value, nominal dollars						
land and buildings: average per farm	$133,808	$176,271	$186,610	$287,080	$454,263	$573,801
land and buildings: average per hectare	$4,754	$5,402	#VALUE!	$12,602	$23,556	$24,505
machinery and equipment: average per farm	$15,031	$18,324	$21,434	$27,426	$25,329	$35,060
Total farm production expenses						
($1,000 nominal)	$4,077	(NA)	(NA)	$9,195	$7,236	$6,351
average per farm (dollars)	$23,703	(NA)	(NA)	$43,372	$38,696	$34,517
Net cash return from sales						
total ($1,000 nominal)	$1,053	(NA)	(NA)	$3,405	$342	$1,467
average per farm (dollars)	$6,123	(NA)	(NA)	$16,060	$1,829	$7,974
number of farms with net gains	(NA)	(NA)	(NA)	90	85	87
number of farms with net losses	(NA)	(NA)	(NA)	122	102	97
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	D	$129	$151
Government payments ($1,000)	(NA)	(NA)	(NA)	$14	$84	$40
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	D	D	$229
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$0	$0	$34

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.29. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	41	50	(NA)	32	50
total (nominal dollars in thousands)	(NA)	$304	$744	(NA)	$396	$596
average per farm (nominal dollars)	(NA)	7,415	14,880	(NA)	$12,362	$11,922
Operators by principal occupation						
Farming	92	106	90	107	90	93
Other	52	97	115	105	96	92
Average age of operator (years)	55.4	53.9	51.6	53.0	55.1	54.7
Operators by days worked off farm						
None	60	93	69	80	78	88
Any	57	96	118	119	95	92
200 days or more	39	71	75	81	58	71
Farm employment, hired farm labor						
farms with hired farm labor	65	100	76	(NA)	48	76
hired farm labor (number workers hired)	542	526	511	(NA)	334	349
hired farm labor (payroll in thousands)	$746	$1,197	$1,124	$3,028	$2,278	$2,049
working 150 days or more (workers)	167	228	149	(NA)	111	113
working fewer than 150 days (workers)	375	298	362	(NA)	223	236
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$2,744	$3,733	$5,030	$7,649	$6,259	$5,533
vegetables, sweet corn, and melons	(NA)	$330	$361	$694	$635	$1,139
dairy products	(NA)	$912	$705	$648	$785	$589
fruits, nuts, and berries	(NA)	$68	$417	$470	(D)	$502

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms
Source: U.S. Census of Agriculture, various years.

Agricultural sales in Norfolk County increased from $5.1 million in 1974 to a high of $13.2 million in 1987 but then fell to $8.3 million in 1997, an ending differential gain of $3.2 million. The average sales per farm doubled from $29,826 in 1974 to $62,454 in 1987, an increase of $32,628, but then decreased to $44,680 in 1997, a final differential gain of $14,854. In real dollars, the 1997 level of sales was not much greater than that in 1974.

The major commodity group in Norfolk County was nursery and greenhouse crops, with $5.5 million in sales in 1997. This commodity rose from having 53 percent of total sales from farms in the county in 1974 to 67 percent of sales in 1997. The commodity group of vegetables, sweet corn, and melons was second in sales, with 14 percent of the total, up from 7 percent in 1978. The third commodity group, dairy, declined from having 16 percent of the sales from farms in the county in 1978 to 7 percent of sales in 1997. The number of dairy farms fell by half, from 21 farms in 1978 to only 10 in 1997. On the positive side, fruits, nuts, and berries sales increased, comprising 6 percent of sales in 1997. All the livestock categories experienced decreased sales over the last four Census periods.

The number of farms engaged in direct marketing of agricultural products increased from 41 farms in 1978 to 50 in 1997, with total direct sales doubling from $304,000 to $596,000 in nominal dollars. Average direct sales from farms using direct marketing in Norfolk County were $11,922 in 1997.

Net cash returns from agricultural sales averaged $7,973 per farm in Norfolk County in 1997. Fifty-three percent of farms experienced net losses in 1997, a slight five-percent decrease from the 58 percent with losses in 1987.

Hired labor was used on 76 farms in 1997. A total of 349 workers received $2 million in payroll. Most employees were seasonal, with 236 (68 percent) working fewer than 150 days.

The average age of farmers in Norfolk County was 54.7 years in 1997, down slightly from the 1974 average of 55.4 years, and close to the state average of 54.9 years. Fifty percent of Norfolk County farmers had principal occupations other than farming in 1997, while only thirty-six percent had been principally employed in off-farm occupations in 1974.

Plymouth County

Agriculture was very important in Plymouth County. The county was a major contribute to the Massachusetts agricultural economy. Plymouth County included 8.4 percent of the Commonwealth's land, 14.2 percent of the farmland, and 9.2 percent of the cropland (Table 2.6). It had 13.1 percent of the state's farms, accounting for 27 percent of Massachusetts agricultural sales (Figure 2.27).

From 1974 to 1997, Plymouth County had increases in the number of farms and sales (Table 2.30), but decreases in farmland and cropland (Table 2.31). Cranberry production increased significantly, contributing to the state's overall increased sales in the fruit, nuts, and berries category. While there were losses in dairy sales, there was an increase in nursery and greenhouse production. Direct-to-consumer sales increased, even though the number of farms using direct sales decreased.

The number of farms increased from 532 in 1974 to 775 farms in 1987, an increase of 243 farms, but then declined to 732 farms in 1997, an ending differential gain of 200 farms. Although there was an increase of farmland, from 31,325 hectares in 1974 to 33,559 hectares in 1978, there was a decline to 29,712 hectares in 1997, an ending differential gain of 1,613 hectares. Cropland increased from 8,726 hectares in 1974 to 9,503 in 1987, but declined to 8,363 in 1997, a differential loss of 363 hectares.

From 1974 to 1997, Plymouth County agricultural sales increased over six-fold, from $18.8 million to $122.7 million, representing a noteworthy 27 percent of all Massachusetts agricultural sales. The average sales per farm also increased, rising from $35,214 in 1974 to $167,605 in 1997. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.31).

Table 2.30. Agricultural product sales, Plymouth County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	532	589	649	775	668	732
Total sales, ($1,000)	$18,734	$25,581	$52,964	$77,374	$95,756	$122,687
Total sales adjusted by PPI ($1,000)	$24,204	$29,169	$52,964	$81,020	$92,429	$108,765
Average sales per farm	$35,214	$43,431	$81,609	$99,837	$143,347	$167,605
Average sales per farm, adjusted by PPI	$45,496	$49,522	$81,609	$104,541	$138,366	$148,586
All crops (farms)	433	468	486	623	546	605
All crops ($1,000)	$11,283	$19,310	$44,244	$73,225	$93,262	$118,591
grains (farms)	(NA)	0	3	1	2	1
grains ($1,000)	(NA)	$0	(D)	(D)	(D)	(D)
tobacco (farms)	(NA)	0	0	0	0	1
tobacco ($1,000)	(NA)	$0	$0	$0	$0	(D)
hay, silage, and field seeds (farms)	(NA)	64	61	92	58	67
hay, silage, and field seeds ($1,000)	(NA)	(D)	$162	$388	$391	$428
vegetables, sweet corn, melons (farms)	(NA)	67	69	68	60	56
vegetables, sweet corn, melons ($1,000)	(NA)	$721	$1,154	$1,449	$1,263	$1,258
fruits, nuts, and berries (farms)	(NA)	335	349	452	422	452
fruits, nuts, and berries ($1,000)	(NA)	$16,407	$40,902	$67,935	$87,520	$112,075
nursery and greenhouse crops (farms)	51	69	67	75	67	104
nursery and greenhouse crops ($1,000)	$1,540	$2,271	$1,979	$3,448	$4,062	$4,816
other crops (farms)	(NA)	3	7	3	8	5
other crops ($1,000)	(NA)	(D)	(D)	(D)	(D)	(D)

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.30. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	143	176	205	175	137	131
All livestock ($1,000):	$7,425	$6,270	$8,720	$4,149	$2,494	$4,095
poultry and poultry products (farms)	4	45	45	44	48	41
poultry and poultry products ($1,000)	$1,518	$676	$208	$196	$177	$443
dairy products (farms)	(NA)	37	37	20	12	11
dairy products ($1,000)	(NA)	$3,892	$6,395	$2,049	$1,512	$2,764
cattle and calves (farms)	(NA)	75	96	66	48	47
cattle and calves ($1,000)	(NA)	$788	$1,037	$788	$224	$155
hogs and pigs (farms)	(NA)	39	46	29	21	22
hogs and pigs ($1,000)	(NA)	$484	$679	$613	$243	$124
sheep, lambs, and wool (farms)	(NA)	28	44	43	36	34
sheep, lambs, and wool ($1,000)	(NA)	$14	$25	$27	$32	$38
other livestock, livestock products (farms)	(NA)	59	67	72	46	45
other livestock, livestock products ($1,000)	(NA)	$417	$377	$475	$306	$571

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.31. Selected farm data for Plymouth County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 171,097						
Land in farms (hectares)	31,325	33,559	32,535	31,219	29,238	29,712
Total cropland (hectares)	8,726	9,014	9,425	9,503	8,151	8,363
Irrigated land (hectares)	3,725	3,830	3,916	4,463	4,408	4,930
Average size of farm (hectares)	59	57	50	40	44	40
Farms (number)	532	589	649	775	668	732
Estimated market value, nominal dollars						
land and buildings: average per farm	$122,406	$155,348	$254,542	$397,271	$643,763	$694,704
land and buildings: average per hectare	$2,078	$2,832	$5,397	$9,792	$15,540	$16,442
machinery and equipment: average per farm	$17,403	$22,547	$35,063	$47,368	$60,495	$60,545
Total farm production expenses						
($1,000 nominal)	$15,923	(NA)	(NA)	$48,394	$61,881	$73,867
average per farm (dollars)	$29,930	(NA)	(NA)	$62,364	$92,637	$101,886
Net cash return from sales						
total ($1,000 nominal)	$2,831	(NA)	(NA)	$29,719	$33,643	$44,695
average per farm (dollars)	$5,284	(NA)	(NA)	$38,298	$50,363	$61,143
number of farms with net gains	(NA)	(NA)	(NA)	461	466	525
number of farms with net losses	(NA)	(NA)	(NA)	315	202	206
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$91	$95	$484
Government payments ($1,000)	(NA)	(NA)	(NA)	(D)	$249	$73
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$311	$868	$1,305
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$53	$64	$34

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.31. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	86	115	(NA)	72	75
total (nominal dollars in thousands)	(NA)	$300	$758	(NA)	$357	$763
average per farm (nominal dollars)	(NA)	3,488	6,591	(NA)	$4,960	$10,174
Operators by principal occupation						
Farming	273	328	369	440	400	439
Other	204	261	280	335	268	293
Average age of operator (years)	56.2	53.0	52.0	52.1	53.3	54.3
Operators by days worked off farm						
None	168	234	246	276	265	319
Any	227	318	344	459	351	365
200 days or more	151	203	216	275	211	219
Farm employment, hired farm labor						
farms with hired farm labor	226	299	257	(NA)	273	308
hired farm labor (number workers hired)	2,540	2,272	2,704	(NA)	2,185	2,311
hired farm labor (payroll in thousands)	$3,527	$4,032	$7,625	$15,369	$21,944	$20,076
working 150 days or more (workers)	435	455	628	(NA)	642	1,108
working fewer than 150 days (workers)	2,105	1,817	2,076	(NA)	1,543	1,203
Year 1997 top commodity group sales	nominal dollars in thousands					
fruits, nuts, and berries	(NA)	$16,407	$40,902	$67,935	$87,520	$112,075
nursery and greenhouse crops	$1,540	$2,271	$1,979	$3,448	$4,062	$4,816
dairy products	(NA)	$3,892	$6,395	$2,049	$1,512	$2,764
vegetables, sweet corn, and melons	(NA)	$721	$1,154	$1,449	$1,263	$1,258

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms
Source: U.S. Census of Agriculture, various years.

Plymouth County's major commodity group was fruits, nuts, and berries. It contributed 64 percent of the county's agricultural sales in 1978 and an increased share of 91 percent in 1997. The number of farms producing fruits, nuts, and berries increased from 335 farms in 1978 to 452 in 1997, a gain of 117 farms. A major portion of the increases were due to cranberry production, which increased from 30,541 tonne in 1974 to 78,570 tonne in 1997. Plymouth County's second commodity group was nursery and greenhouse, contributing 4 percent of the county's sales in 1997. The number of farms engaged in the production of nursery and greenhouse crops more than doubled, from 51 farms in 1974 to 104 in 1997. Third in sales in 1997 with 2 percent of the total was the group of dairy, which declined from having 15 percent of the county's total in 1978. The number of dairy farms fell from 37 farms in 1978 to only 11 in 1997. The commodity group of vegetables, sweet corn, and melons represented 1 percent of Plymouth County's total sales in 1997.

Although the number of farms using direct marketing to sell agricultural products fell from 86 farms in 1978 to 75 in 1997, total direct sales more than doubled from $300,000 to $763,000 in nominal dollars. Average direct sales for farms using direct marketing in Plymouth County were $10,174 in 1997.

Net cash returns averaged $61,143 per farm in Plymouth County in 1997. Twenty-eight percent of farms had net losses in 1997, a thirteen-percentage-point decrease from the 41 percent with losses in 1987. Hired labor was used on

308 farms in 1997. A total of 2,311 workers received $20.1 million in payroll. Most employees were seasonal, with 1,203 (52 percent) working fewer than 150 days.

The average age of farmers in Plymouth County was 54.3 years in 1997, down slightly from the 1974 average of 56.2, and slightly lower than the state average of 54.9 years. Forty percent of Plymouth County farmers had principal occupations other than farming in 1997, which was not much different from the 43 percent who were principally employed in off-farm occupations in 1974.

Suffolk County

Suffolk County, the county in which Boston is located, has very few farms. It is the smallest county in land area with 0.7 percent of the state total and with fewer than three hectares reported to be in farmland (Table 2.6). The two top agricultural commodity groups were nursery and greenhouse crops and vegetables, sweet corn, and melons. In 1997, five farms produced $263,000 in sales, which was a $233,000 decrease from the $496,000 in sales from six farms in 1974 (Table 2.32). In 1997, net cash returns from agricultural sales averaged $238 per farm, with 20 percent of farms having net losses (Table 2.33). Hired labor was used on three farms in 1997, with a total of nine workers. Two out of five farmers had principal occupations other than farming. The average age of farmers increased 16 years, from 41.0 years in 1974 to 57.3 years in 1997.

Table 2.32. Agricultural product sales, Suffolk County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	6	5	4	5	2	5
Total sales, ($1,000)	$496	$360	$152	(D)	(D)	$263
Total sales adjusted by PPI ($1,000)	$641	$410	$152	(D)	(D)	$233
Average sales per farm	$82,667	$72,003	$38,005	(D)	(D)	$52,620
Average sales per farm, adjusted by PPI	$106,805	$82,101	$38,005	(D)	(D)	$46,649
All crops (farms)	6	3	4	3	2	5
All crops ($1,000)	$496	(D)	$152	$329	(D)	$263
grains (farms)	(NA)	0	0	0	0	0
fruits, nuts, and berries (farms)	(NA)	$0	$0	$0	$0	$0
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	0	0	0	0	0
hay, silage, and field seeds ($1,000)	(NA)	$0	$0	$0	$0	$0
vegetables, sweet corn, melons (farms)	(NA)	0	1	0	0	1
vegetables, sweet corn, melons ($1,000)	(NA)	$0	(D)	$0	$0	(D)
fruits, nuts, and berries ($1,000)	(NA)	0	1	0	0	0
fruits, nuts, and berries ($1,000	(NA)	$0	(D)	$0	$0	$0
nursery and greenhouse crops (farms)	5	3	4	3	2	5
nursery and greenhouse crops ($1,000)	$495	(D)	(D)	$329	(D)	(D)
other crops (farms)	(NA)	0	0	0	0	0
other crops ($1,000)	(NA)	$0	$0	$0	$0	$0

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.32. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	0	2	0	1	0	0
All livestock ($1,000):	$0	(D)	$0	(D)	$0	$0
poultry and poultry products (farms)	0	0	0	0	0	0
poultry and poultry products ($1,000)	$0	$0	$0	$0	$0	$0
dairy products (farms)	(NA)	0	0	0	0	0
dairy products ($1,000)	(NA)	$0	$0	$0	$0	$0
cattle and calves (farms)	(NA)	0	0	0	0	0
cattle and calves ($1,000)	(NA)	$0	$0	$0	$0	$0
hogs and pigs (farms)	(NA)	0	0	0	0	0
hogs and pigs ($1,000)	(NA)	$0	$0	$0	$0	$0
sheep, lambs, and wool (farms)	(NA)	0	0	0	0	0
sheep, lambs, and wool ($1,000)	(NA)	$0	$0	$0	$0	$0
other livestock, livestock products (farms)	(NA)	0	2	1	0	0
other livestock, livestock products ($1,000)	(NA)	$0	(D)	(D)	$0	$0

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.33. Selected farm data for Suffolk County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 15,157						
Land in farms (hectares)	6	9	(D)	(D)	(D)	3
Total cropland (hectares)	6	(D)	5	4	(D)	(D)
Irrigated land (hectares)	2	(D)	3	(D)	(D)	1
Average size of farm (hectares)	1	2	(D)	(D)	(D)	0
Farms (number)	6	5	4	5	2	5
Estimated market value, nominal dollars						
land and buildings: average per farm	131,833	$48,000	$147,250	(D)	(D)	$339,000
land and buildings: average per hectare	130,301	$26,956	(D)	(D)	(D)	$598,327
machinery and equipment: average per farm	7,600	$11,017	$23,250	$17,492	(D)	$18,550
Total farm production expenses						
($1,000 nominal)	$314	(NA)	(NA)	$256	(D)	$264
average per farm (dollars)	$52,333	(NA)	(NA)	$51,246	(D)	$52,858
Net cash return from sales						
total ($1,000 nominal)	182	(NA)	(NA)	(D)	(D)	$1
average per farm (dollars)	$30,334	(NA)	(NA)	(D)	(D)	$238
number of farms with net gains	(NA)	(NA)	(NA)	4	2	4
number of farms with net losses	(NA)	(NA)	(NA)	1	0	1
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$0	$0	$0
Government payments ($1,000)	(NA)	(NA)	(NA)	$0	$0	$0
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$0	$0	$0
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$0	$0	$0

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.33. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	0	0	(NA)	1	1
total (nominal dollars in thousands)	(NA)	$0	$0	(NA)	(D)	(D)
average per farm (nominal dollars)	(NA)	0	0	(NA)	(D)	(D)
Operators by principal occupation						
Farming	0	2	3	1	2	3
Other	4	3	1	4	0	2
Average age of operator (years)	41.0	51.0	56.0	47.4	(D)	57.4
Operators by days worked off farm						
None	0	4	2	3	2	1
Any	1	1	1	2	0	3
200 days or more	1	1	0	1	0	0
Farm employment, hired farm labor						
farms with hired farm labor	(NA)	3	4	(NA)	1	3
hired farm labor (number workers hired)	(NA)	6	11	(NA)	(D)	9
hired farm labor (payroll in thousands)	(NA)	$33	$26	(D)	(D)	(D)
working 150 days or more (workers)	(NA)	6	(D)	(NA)	(D)	(D)
working fewer than 150 days (workers)	(NA)	0	(D)	(NA)	(D)	(D)
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$495	(D)	(D)	$329	(D)	(D)

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms
Source: U.S. Census of Agriculture, various years.

Worcester County

Worcester County is the largest county in Massachusetts. Worcester County had 19.3 percent of the Commonwealth's land, 20 percent of the farmland, and 19.7 percent of the cropland (Table 2.6). It had 17.6 percent of the state's farms, accounting for 12.8 percent of Massachusetts agriculture sales (Figure 2.27).

The number of farms and sales of farm products (Table 2.34) increased from 1974 to 1997 in Worcester County, but farmland and cropland decreased (Table 2.35). Dairy sales decreased, but nursery and greenhouse crop sales increased. Agriculture remained diversified, with real losses in the livestock sector compensated for by increases in crop production. Direct-to-consumer sales increased, even though the number of farms using direct sales decreased.

Worcester County had an increase in the number of farms, from 816 farms in 1974 to 1,191 in 1987, but then had a decrease to 984 in 1997, a final differential gain of only 168 farms. Farmland increased from 52,913 hectares in 1974 to 54,509 hectares in 1987 but then declined to 41,846 hectares in 1997, with a final differential decrease of 11,067 hectares. There were 22,840 hectares of cropland in 1974, 25,011 hectares in 1987, and 17,826 hectares in 1997, with an ending differential decrease of 5,014 hectares.

Table 2.34. Agricultural product sales, Worcester County, Massachusetts, 1974-1997.

	1974	1978	1982	1987	1992	1997
Number of farms	816	864	1,014	1,191	997	984
Total sales, ($1,000)	$32,253	$36,450	$47,319	$54,309	$49,636	$57,949
Total sales adjusted by PPI ($1,000)	$41,671	$41,562	$47,319	$56,868	$47,911	$51,373
Average sales per farm	$39,526	$42,188	$46,666	$45,599	$49,785	$58,891
Average sales per farm, adjusted by PPI	$51,067	$48,105	$46,666	$47,748	$48,055	$52,208
All crops (farms)	466	441	549	632	627	679
All crops ($1,000)	$8,698	$11,248	$13,005	$19,063	$24,981	$31,803
grains (farms)	(NA)	3	3	7	4	7
grains ($1,000)	(NA)	$8	(D)	$73	$6	$42
tobacco (farms)	(NA)	0	0	0	0	0
tobacco ($1,000)	(NA)	$0	$0	$0	$0	$0
hay, silage, and field seeds (farms)	(NA)	239	299	372	353	355
hay, silage, and field seeds ($1,000)	(NA)	$925	$1,373	$1,896	$2,528	$2,733
vegetables, sweet corn, melons (farms)	(NA)	107	148	151	161	137
vegetables, sweet corn, melons ($1,000)	(NA)	$1,226	$2,171	$3,201	$3,231	$4,475
fruits, nuts, and berries (farms)	(NA)	115	150	142	156	130
fruits, nuts, and berries ($1,000	(NA)	$5,459	$6,465	$6,930	$8,321	$7,145
nursery and greenhouse crops (farms)	75	75	95	123	141	229
nursery and greenhouse crops ($1,000)	$2,115	$3,602	$2,845	$6,932	$10,863	$17,335
other crops (farms)	(NA)	11	18	14	9	27
other crops ($1,000)	(NA)	$28	(D)	$31	$32	$71

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

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Table 2.34. (continued)

	1974	1978	1982	1987	1992	1997
All livestock (farms):	562	590	637	668	478	439
All livestock ($1,000):	$23,451	$25,203	$34,314	$35,246	$24,654	$26,146
poultry and poultry products (farms)	73	85	95	109	66	82
poultry and poultry products ($1,000)	$8,432	$6,121	$9,873	$14,046	$6,761	$10,595
dairy products (farms)	(NA)	230	219	155	121	85
dairy products ($1,000)	(NA)	$14,495	$19,896	$16,095	$14,247	$12,873
cattle and calves (farms)	(NA)	445	468	419	292	269
cattle and calves ($1,000)	(NA)	$2,891	$2,738	$2,669	$1,950	$1,281
hogs and pigs (farms)	(NA)	100	109	94	67	53
hogs and pigs ($1,000)	(NA)	$1,356	$1,215	$726	$455	$435
sheep, lambs, and wool (farms)	(NA)	55	69	127	96	77
sheep, lambs, and wool ($1,000)	(NA)	$39	$72	$95	$95	$70
other livestock, livestock products (farms)	(NA)	84	94	145	106	88
other livestock, livestock products ($1,000)	(NA)	$300	$520	$1,614	$1,147	$893

(D) = data withheld to avoid disclosure of individual farms, (NA) = data not available,
PPI = Producer Price Index for farm products.
Source: U.S. Census of Agriculture, various years.

Table 2.35. Selected farm data for Worcester County, Massachusetts,1974-1997.

	1974	1978	1982	1987	1992	1997
Approximate land area (hectares) 391,921						
Land in farms (hectares)	52,913	52,415	54,073	54,509	46,462	41,846
Total cropland (hectares)	22,840	24,034	23,299	25,011	19,685	17,826
Irrigated land (hectares)	244	248	463	339	293	516
Average size of farm (hectares)	65	61	53	46	47	42
Farms (number)	816	864	1,014	1,191	997	984
Estimated market value, nominal dollars						
land and buildings: average per farm	$122,713	$177,199	$194,823	$443,586	$403,851	$377,579
land and buildings: average per hectare	$1,893	$2,740	$3,931	$9,293	$8,933	$10,467
machinery and equipment: average per farm	$19,455	$24,558	$28,200	$31,010	$31,386	$38,750
Total farm production expenses						
($1,000 nominal)	$27,545	(NA)	(NA)	$45,099	$41,582	$43,480
average per farm (dollars)	$33,756	(NA)	(NA)	$37,898	$41,707	$44,232
Net cash return from sales						
total ($1,000 nominal)	$4,708	(NA)	(NA)	$9,819	$6,958	$13,747
average per farm (dollars)	$5,770	(NA)	(NA)	$8,251	$6,979	$13,984
number of farms with net gains	(NA)	(NA)	(NA)	517	439	455
number of farms with net losses	(NA)	(NA)	(NA)	673	558	528
Forest products, total sales ($1,000),						
excluding Christmas trees & maple products	(NA)	(NA)	(NA)	$231	$383	$268
Government payments ($1,000)	(NA)	(NA)	(NA)	$448	$191	$285
Customwork and other agri. services ($1,000)	(NA)	(NA)	(NA)	$279	$456	$231
Rental of farmland ($1,000)	(NA)	(NA)	(NA)	$167	$52	$56

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms

Source: U.S. Census of Agriculture, various years.

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Table 2.35. (continued)

	1974	1978	1982	1987	1992	1997
Sales directly to individuals for human consumption						
farms with direct sales	(NA)	190	284	(NA)	208	217
total (nominal dollars in thousands)	(NA)	$2,854	$3,450	(NA)	$4,072	$4,725
average per farm (nominal dollars)	(NA)	15,021	12,148	(NA)	$19,575	$21,775
Operators by principal occupation						
Farming	472	480	547	566	542	486
Other	304	384	467	625	455	498
Average age of operator (years)	52.9	51.8	51.4	52.2	55.0	55.9
Operators by days worked off farm						
None	320	365	403	427	424	381
Any	331	462	532	706	514	540
200 days or more	224	320	363	485	320	364
Farm employment, hired farm labor						
farms with hired farm labor	299	461	458	(NA)	288	271
hired farm labor (number workers hired)	3,101	3,302	2,882	(NA)	1,697	1,825
hired farm labor (payroll in thousands)	$4,060	$5,839	$5,951	$8,190	$9,986	$9,187
working 150 days or more (workers)	623	872	820	(NA)	636	676
working fewer than 150 days (workers)	2,478	2,430	2,062	(NA)	1,061	1,149
Year 1997 top commodity group sales	nominal dollars in thousands					
nursery and greenhouse crops	$2,115	$3,602	$2,845	$6,932	$10,863	$17,335
dairy products	(NA)	$14,495	$19,896	$16,095	$14,247	$12,873
poultry and poultry products	$8,432	$6,121	$9,873	$14,046	$6,761	$10,595
fruits, nuts, and berries	(NA)	$5,459	$6,465	$6,930	$8,321	$7,145
vegetables, sweet corn, and melons	(NA)	$1,226	$2,171	$3,201	$3,231	$4,475

(NA) = data not available (D) = data withheld to avoid disclosure of individual farms
Source: U.S. Census of Agriculture, various years.

Worcester County's agricultural sales nearly doubled from $32.2 million in 1974 to $57.9 million in 1997. Average sales per farm also increased from $39,526 in 1974 to $58,891 in 1997. These nominal increases were also real increases in dollars adjusted by the Producer Price Index for farm products (Table 2.34).

Worcester County's major commodity group was nursery and greenhouse crops, with $17.3 million in sales in 1997. Nursery and greenhouse crop sales increased eight-fold, and represented 7 percent of the county's total agricultural sales in 1974, 30 percent of all agricultural sales in 1997. Dairy decreased from 40 percent of total agricultural sales in 1978 to 22 percent in 1992. The number of dairy farms fell from 230 farms in 1978 to only 85 in 1997. The third commodity group, at 18 percent of sales, was poultry. The number of poultry farms increased from 73 farms in 1974 to 109 farms in 1987, but then decreased to 82 farms in 1997, a final differential gain of only 9 farms. The fourth group in agricultural sales, fruits, nuts, and berries, produced 12 percent of sales in 1997. The commodity group of vegetables, sweet corn, and melons contributed 8 percent of total sales, and the commodity group of hay, silage, and field seeds represented 5 percent of total sales. Livestock sales of cattle, calves, hogs, and pigs declined four-fold, from a total of 12 percent of agricultural sales in 1978 to 3 percent in 1997.

The number of farms using direct marketing to sell agricultural products increased from 190 in 1978 to 217 in 1997, a gain of 27 farms, with total direct sales rising from $2.9 million to $4.7 million in nominal dollars. Average direct sales for farms using direct marketing in Worcester County were $21,775 in 1997.

Net cash returns from agricultural sales averaged $13,984 per farm in Worcester County in 1997. Fifty-four percent of farms experienced net losses in 1997, a slight decrease from the over 56 percent with losses in 1987.

Hired labor was used on 271 farms in 1997. A total of 1,825 workers received $9.2 million in payroll. Most employees were seasonal, with 1,149 (63 percent) working fewer than 150 days.

In 1997, the average age of farmers in Worcester County was 55.9 years, up from the 1974 average of 52.9 years. Fifty-one percent of Worcester County farmers had principal occupations other than farming in 1997, while only 39 percent were principally employed in off-farm occupations in 1974.

The Promising Future of Farming in Massachusetts

Farming in Massachusetts presents distinct challenges to farmers. Many feel uncertain about who will replace them when they retire if financial incentives

for farmers remain inadequate. They face constant temptation to sell their farmland to developers when higher land prices appear more lucrative than farm profits. Farmers will continue to be challenged by the pressing needs for increased profitability and the pro-active strategies to achieve it.

The new generation of farmers in Massachusetts must be able to justify high financial investment costs of land, buildings, equipment, and supplies, as well as the high costs of labor, with the promise of reasonable financial returns. More than ever, Massachusetts farmers must hone their business-management skills to keep their operations viable, thereby capitalizing on the advantages of farming and minimizing the disadvantages of farming in the state. Naturally, the goal of farmers in Massachusetts is not just to remain economically solvent but to succeed in the competitive marketplace.

While it is true that the loss of farmland in Massachusetts is a concern to those who wish to maintain scenic rural vistas, the assumption that agriculture in the state is declining is not valid. On the contrary, data from the 1997 Census prove that the Massachusetts agricultural economy made a remarkable recovery and promises to continue its valuable contribution to the state's economy. Changing farming practices will give the Commonwealth's farmers an opportunity to prosper in the twenty-first century.

CHAPTER III

FOOD SELF-SUFFICIENCY IN THE NEW ENGLAND STATES

Overview

This chapter examines the extent to which primary food-production sectors of New England's agricultural economy retained production and were able to satisfy the greater consumer demand from an increasing population. The major food groups of New England production in 1997 were meat, dairy, poultry, eggs, vegetables, fruits, and seafood. Comparing consumers' expenditures to the value of food produced in these various food categories provides a relative measure of the respective levels of self-sufficiency for each sector. Calculations were made to determine New England's 1997 levels of self-sufficiency; that is, the region's ability to provide for consumer needs without considering trade with other regions. Data are also provided to indicate levels of self-sufficiency in 1975. By comparing the levels of self-sufficiency of 1997 to that of 1975, it is possible to learn which categories demonstrated growth and which categories experienced losses in meeting changing consumer demands.

The study found that the levels of self-sufficiency for many of the major food groups grew significantly over the years, although it is important to acknowledge that increasing self-sufficiency in all categories may not have been

possible or even desirable in view of the economic benefits of trade to and from other regions. In any case, most implications of the study are encouraging for those concerned with maintaining a viable agriculture in New England. Regional food production continued to improve, implying that under the right conditions, the outlook for future growth was possible.

Historical Background

To quickly attain an adequate level of food self-sufficiency was an important goal for Colonial farmers, who later turned to trade to supplement their needs for certain commodities. When the Colonists landed in New England, they found cleared farmland cultivated by southern New England Indians, who hunted, fished, and grew crops such as corn, beans, and squash (Cronon, 1983) (Russell,1976). In time, Colonial farmers secured their food supply by also successfully growing indigenous crops to meet their dietary needs for survival, supplemented by hunting and fishing. Later, they prospered by trading their surplus crops to fur traders from other regions so as to have a trade commodity for European buyers. Through intercontinental trading, the Colonists moved beyond subsistence farming on a simple but adequate level to the more complex level of trading for the acquisition of goods they could not produce for themselves. In short, the Colonial farmers reached an initial level of self-sufficiency by having the means to meet their food needs on a modest scale, through virtue of their intelligence and diligence. Then, having established an

adequate food supply for themselves, they also engaged in agricultural export, the Colonists' first instance of commercial agriculture in New England.

Over the next two and a half centuries, newcomers from Europe continued to settle in New England, clearing the land of stones and rocks so they could cultivate the soil (Cronon) (Russell). Numerous surviving stonewalls that bordered farm fields testify to the hard work of these New England farmers. In their determination to prosper, they developed the now familiar virtues of Yankee perseverance and ingenuity. The ability of farmers to work hard to reach goals and to invent practical solutions to problems stood them in good stead. When farmers eventually turned to dairy, horticulture, and specialty crops, they were able to satisfy growing markets for the fresh, perishable foods and ornamental plants demanded by a rapidly growing population.

Today's Farmers and Consumers

Farmers in New England today have inherited an agricultural legacy with roots tracing back to Colonial times. Even as the populations of the New England states burgeoned at the end of the twentieth century, consumers continued to cherish their agricultural heritage by putting a high value on local agriculture. Currently, there has been a resurgence of interest in local agriculture (Wilkins, 1995, p 151-155). Farmers, some of whom are eighth-generation descendents of the original Colonial farmers, have persisted in growing crops

and raising livestock, responding to increased demands for local foods and goods while diversifying income sources by adding enterprises such as agri-entertainment (Appendix). In response to strong public interest in the viability of New England agriculture, the objective of this chapter is to ascertain whether food production in New England lost ground over time, stayed constant, or actually gained ground. The results below provide evidence to address this objective.

The Quest for Self-Sufficiency

Establishing and maintaining a high level of food self-sufficiency can enhance on-going economic viability (Terrill, 1982). On the national level, high levels of food production help ensure the security and safety of the food supply for all citizens of the country. At the state level, high indicators of food self-sufficiency provide protection against catastrophic natural disasters, such as earthquakes, floods, or plant disease in other regions, or even against disruptions in the inter-state transportation system. On the community level, high levels of local food self-sufficiency evoke a spirit of rugged individualism that appeals to many New England consumers. Indicators include successful niche markets for specialty products such as free-range eggs, organic turkeys, and locally produced and processed milk. Even though high levels of self-sufficiency have positive social values, the cost of reaching the highest possible levels of self-sufficiency would be too high if it necessitated the loss of consumer gains

provided by open trade. Through inter-regional trade, consumers benefit from lower prices resulting from the application of the principles of absolute advantage and comparative advantage.

Absolute and Comparative Advantage

As in Colonial times, today's farmers continue to strive for the highest possible levels of food production in diverse categories to meet consumer demands. However, state and regional economies also rely on the export and import of certain foods and goods to make up the difference between local production and total consumption needs. A surplus in some categories can be exported. In other food categories, low or non-existent levels of production necessitate imports to meet consumption needs and desires. Absolute advantage means that a particular region can produce certain foods and goods at a lower cost than another region can (Kay, 1981). This lower cost advantage is due to factors such as regional climate, indigenous natural resources, or the existence of an established specialized labor force. Comparative advantage comes about because of differing opportunity costs, the numbers of goods or services that could be produced instead of those currently produced. A region has a comparative advantage in producing foods and goods for which it has to give up little (in terms of other foods and goods that it could otherwise be producing) compared to the price that the region receives from exporting the products. For example, the Northeast has the advantage of soil and weather

favorable to the production of both wheat and vegetables. If the potential economic value of producing vegetables is greater than that of wheat, the farmer will choose to produce vegetables. To produce vegetables, the farmer forgoes the value that could have been received by producing wheat. It makes better economic sense for the Northeast to import wheat from outside regions, for which the opportunity cost of growing wheat is lower, than to grow wheat in New England at a higher opportunity cost. Otherwise, subsidies financed by tax dollars would have to be implemented as a financial incentive for farmers to overcome the higher opportunity cost of growing crops for which the Northeast does not have a comparative advantage. In this case, due to its comparative *disadvantage*, such a misguided subsidy would result in losses for both farmers and consumers.

The Advantages of Trade

In addition to benefits of absolute advantage and comparative advantage, economists also look to the gains posed by specialization and trade so as to achieve the highest possible levels of consumer satisfaction. If farmers in New England realize that they are better off specializing in those foods and products offering a comparative advantage, they will most likely choose to produce a surplus, which can be traded for the many other goods and services that consumers demand. For example, Massachusetts has a comparative advantage in cranberries. A surplus of cranberries is produced for export to other regions.

A considerable amount of fresh cranberries are processed into higher value products such as cranberry drink blends and dried cranberries. Ultimately, fresh cranberries and cranberry products are traded for foods and goods that must be imported such as oranges, bananas, and tea.

Today's consumers expect to be able to choose among the vast variety of foods and products available through inter-regional and global trade. For instance, because so many New England consumers now want fresh strawberries all year, not just in season, fresh strawberries are flown in from Chile during the cold of winter. A foreign country in the Southern Hemisphere such as Chile with warm winter temperatures has absolute and comparative advantage for selling fresh strawberries during the New England winter, when fresh strawberries cannot be grown in the freezing temperatures of the Northeast. In the summer, however, consumers in New England are enticed by locally grown, deep-red, ripe, fragrant strawberries. Specialization and trade guarantee today's consumers a wide selection of both local and imported foods and products throughout the year. In this way, consumers have the satisfaction of choosing among foods and products they deem to be the most desirable at the particular time of purchase. Their choices often represent complex decisions based on many factors, the importance of which varies with the individual consumer. For example, some consumers rank price as the critical factor, while others say it is how the food tastes or where it was grown (Holm, 1991).

The Purpose of a New Self-Sufficiency Study

While it is true that specialization and trade are essential for consumer satisfaction and maximum economic gains, there is still public interest in making an accurate assessment of New England's current levels of self-sufficiency, the extent to which farmers can provide for consumer needs in the major food groups. By having precise, quantified information, agricultural advocates and policymakers can gain insights into how well the agricultural sector is currently performing in New England. By contrasting data describing the state of the agricultural sector in 1997 to that of 1975, they can clearly comprehend how much the agricultural economy has changed over the last couple of decades. Data on the present, the past, and changes from the past to the present provide evidence for analysis that can guide advocates and policymakers in public policy debates concerning future land use and development.

The 1975 Self-Sufficiency Study

Concerns over regional food self-sufficiency in the 1970s inspired Bahn and Christensen (Bahn, 1979) to undertake an analytical study of regional food production and consumption, utilizing aggregate analyses of the major food groups. Their results presented the quantity of food consumed in each of the major commodity groups in the New England states, the total cash receipts of farmers and fishers from each food group in each state, the retail value of farm

and fishery production, and the percentage of consumption expenditures within each commodity group met by the primary food producers of each state. The study determined which of New England's various agricultural product categories met consumer demands. The research done by Bahn and Christensen indicated that New England's major food assets in 1975 were seafood, dairy, and poultry and eggs, and selective fruits and vegetables. The region's minor assets were meat and all other products.

Bahn and Christensen's study has two weaknesses that should be recognized. The researchers admit that there were inherent limitations to a study that utilized aggregate analysis. Erroneous generalizations regarding self-sufficiency can easily be made if misleading self-sufficiency general indicators are based on too few groupings of food commodities. To illustrate, Bahn and Christensen cautioned against believing in the illusion of greater self-sufficiency within the broad fruit and vegetable category resulting from large-scale production of individual commodities such as apples and potatoes. In addition, Bahn and Christensen were careful to point out that incorrect assessments of the overall level of self-sufficiency can result from inclusion of a high value food group along with relatively low value food groups. To provide a case in point, Bahn and Christensen used the example of the seafood food group. Since New England surpasses self-sufficiency in seafood production, the inclusion (or exclusion) of the seafood food group arbitrarily tips the scale of self-sufficiency up (or down).

In short, any reader of the Bahn and Christensen paper and this updated analysis should guard against making two errors: incorrect hasty generalizations about a food group self-sufficiency measure based on high production of a few high value items within a food group, and overall self-sufficiency measures resulting from combining a high value food-group and low value food group. In so doing, readers can avoid making false inferences. In spite of the self-defined potential weaknesses of Bahn and Christensen's study, the purpose, design, and supporting evidence of their study are fundamentally sound. Their paper will remain a classic study through which researchers will have access to the information needed for an understanding of the relative levels of self-sufficiency of food production in New England.

An innovative revision to the Bahn and Christensen study that today's researcher could make is to include a consideration of regional differences in the consumption of local, specialized foods. Bahn and Chistensen assumed that regional differences in the consumption of major foods were too insignificant to be included in their study. By doing so, they may have overlooked the importance of local, specialized foods within the regions. Interestingly, differences in regional consumption patterns were evident for a specialty, fresh seafood, twenty years ago. Back then, many local foods may have been primarily consumed within their region of origin and not been as readily available in outside regions; that is, fresh seafood may have been consumed primarily in

coastal areas, not in a distant region such as the Midwest. Bahn and Christensen might have included data on this phenomenon of regional patterns of consumption in their study and then analyzed whether or not they were significant. The updated analysis in this chapter includes consumption data that account for regional differences.

A second revision to Bahn and Christensen's study is to account for direct-marketed farm products. The value of farm products that are sold directly to consumers should be removed from total farm receipts prior to making the farm-to-retail adjustment of farm gate receipts. For example, Massachusetts farmers reported sales of $541.3 million in 1997, including direct-to-the-consumer marketing sales of $19.8 million. The retail value of farm product sales would be overstated if the farm-to-retail adjustment were applied to the entire $541.3 million because 19.8 million were reported at retail value.

The 1997 Update

Since 1975, population levels rose in all New England states and together account for a significant increase for the entire region (Table 3.1). This chapter considers whether or not farm production has been able to keep pace with the increased demands of New England's greater population or if the New England states have become greater net importers of food.

Table 3.1. Population changes in New England states, 1975-1997, and number of households, 1997.

	1975	1980	1985	1990	1995	1997	Change from 1975 to 1997	Households in 1997
	thousands							
Connecticut	3,083	3,108	3,201	3,289	3,265	3,269	6.0%	1,234,288
Maine	1,072	1,125	1,163	1,231	1,237	1,245	16.2%	485,218
Massachusetts	5,758	5,737	5,881	6,019	6,062	6,115	6.2%	2,329,647
New Hampshire	829	921	997	1,112	1,146	1,173	41.6%	444,246
Rhode Island	943	947	969	1,005	989	987	4.7%	376,377
Vermont	480	511	530	565	583	589	22.7%	228,670
New England	12,163	12,348	12,741	13,220	13,278	13,378	10.0%	5,098,446

Source: U.S. Department of Commerce, U.S. Census Bureau, Population Division, Washington, DC.

The release of the 1997 Census of Agriculture made it possible to update the 1975 report to determine how well the New England states fared since 1975. This following analysis uses the same approach as that of Bahn and Christensen (1979) to ensure the two are comparable. Data from government sources are used to calculate levels of food production self-sufficiency for each state and the Northeast region. In addition to having aggregated national food consumption data, researchers today have access to detailed consumption expenditures on a per-household basis along with the number of households for each state. Also, consumption expenditure data are now also available on a regional basis, allowing for an accounting of regional variations. It is now possible to report some information in a less aggregated format. For example, the values of poultry and eggs and the values of fruits and vegetables are no longer reported as two aggregated food groups but instead as four separate food groups. Finally, the value of sales directly to consumers is available, thereby allowing this amount to be excluded from the farm-to-retail adjustments.

In this study, total consumer retail food expenditures for each state were estimated based on the number of households and expenditures per household for each of ten different food groups. Farm-gate receipts for agricultural products and dock prices for commercial landings of seafood were adjusted to retail value, using farm-retail price spreads. Comparing the retail value of receipts to the estimated consumer expenditures for a food category provides an informative estimate of overall food production self-sufficiency for that food category in New

England. Aggregating individual food category results provides a summarized estimation of New England food self-sufficiency.

Retail Food Expenditures

Household food expenditures in the Northeast along with the number of households in each state were used to estimate each New England state's total food expenditures. Data on food expenditure per household are survey results. These surveys were conducted in several regions across the country including the Northeast. Household food expenditures were not available for only the New England states, so the Northeast regional figures were used. Data were available in two categories: food consumed at home and away from home. Total food expenditures per household included both of these categories, but only expenditures for food consumed at home was available in greater detail by food group. Relative expenditure shares for different food groups were assumed to be the same for consumption at home and away from home. The relative shares of at-home household expenditures for food groups were used to allocate the value of food consumed away from home to the different food groups (Table 3.2).

The food groups considered relevant to New England producers include meat, dairy, poultry, eggs, vegetables, fruit, and fish and seafood. Consumers spent a smaller portion of their overall food expenditures on these categories in 1997 (55 percent) than they did in 1975, when they spent 73 percent on these

items. A much greater proportion of the consumer's dollar was spent on bakery and cereal products and miscellaneous food items in 1997 than was spent in 1975. The estimated value of food expenditure for all consumers within each state and the region is given in Table 3.3.

Table 3.2. Household food expenditures for the Northeast, 1997

Food consumed away from home	$2,445	Estimated		Proportions
Food consumed at home	$2,912	overall in 1997		in 1975
Meat	$467	$859	16%	27%
Dairy	$327	$602	11%	14%
Poultry	$177	$326	6%	7%
Eggs	$36	$66	1%	
Vegetables (fresh and processed)	$241	$443	8%	21%
Fruit (fresh and processed)	$284	$522	10%	
Fish and seafood	$108	$199	4%	3%
Bakery and cereal products	$504	$927	17%	14%
Miscellaneous food products	$768	$1,413	26%	13%
Relevant to New England producers (% of total)			56%	73%

Sources: US Dept. of Commerce, Bureau of Labor Statistics, Consumer expenditure survey, 1997. 1975 values from Bahn and Christensen, 1979.
Note: The estimated overall expenditures are calculated by allocating the value of food consumed away from home to food groups at the same relative proportions as food consumed at home.

Food Production

The U.S. Department of Agriculture collects information on the value of farm products sold, indicates the retail value of final food sales to the consumer, and calculates a farm-retail price spread. The farm-retail price spread is an estimate of the difference between the farm-gate price and the final cost to the

consumer. It is expressed as the farm-value percentage of the final consumer expenditure. A similar measure can be estimated for seafood, using U.S. Department of Commerce data on commercial landings and imports of seafood, Census data on farm aquaculture, and their final retail sales value. A price spread for seafood can be calculated by dividing the dockside and farmgate value by the final retail value.

Cash receipts from primary marketing of each food group relevant to New England producers are given in Table 3.4. Massachusetts producers (farmers and fishers) accounted for $541 million of New England's total food production, about 26 percent. This was second only to Maine's $656 million, about 32 percent of New England's total production.

Table 3.5 presents estimates of farm-retail price spreads or the portions of consumer dollars that producers receive. These national data are used to estimate the retail values for each of the food categories important to New England producers. Multiplying producers' cash receipts (Table 3.4) by the U.S. ratio of retail value to farm value (Table 3.5) results in estimates of final consumer retail values for food produced in New England states (Table 3.6).

The percent of consumer dollars going to farmers in 1997 was lower than it had been in 1975. This is consistent with data from the Economic Research Service, which shows that the overall farm value component of consumer

Table 3.3. Estimated value of food expenditures by major food groups, New England states, 1997.

	Meat	Dairy	Poultry	Eggs	Vegetables	Fruit	Seafood	Bakery & cereals	Miscellaneous food products
	millions								
Connecticut	$1,060	$742	$402	$82	$547	$645	$245	$1,144	$1,744
Maine	$417	$292	$158	$32	$215	$254	$96	$450	$686
Massachusetts	$2,001	$1,401	$759	$154	$1,033	$1,217	$463	$2,160	$3,291
New Hampshire	$382	$267	$145	$29	$197	$232	$88	$412	$628
Rhode Island	$323	$226	$123	$25	$167	$197	$75	$349	$532
Vermont	$196	$138	$74	$15	$101	$119	$45	$212	$323
New England	$4,380	$3,067	$1,660	$338	$2,260	$2,664	$1,013	$4,727	$7,203

Note: Food consumed away from home included in same relative proportions as at home consumption.

Table 3.4. Cash receipts from farm and fishery sales by major food group, New England 1997.

	Meat	Dairy	Poultry	Eggs	Vegetables	Fruits	Seafood	Total
	millions							
Connecticut	$11.5	$76.1	$15.5	$45.7	$22.5	$16.1	$50.7	$238.1
Maine	$19.0	$95.6	$4.9	$82.9	$114.7	$47.5	$291.9	$656.6
Massachusetts	$9.2	$66.1	$3.2	$7.9	$60.4	$163.4	$231.0	$541.3
New Hampshire	$6.5	$47.2	$8.0	$3.2	$14.9	$11.8	$13.4	$105.0
Rhode Island	$1.5	$4.6	$0.6	$1.2	$6.9	$2.8	$78.4	$96.0
Vermont	$36.1	$368.6	$0.7	$2.8	$12.2	$11.9	$0.2	$432.4
New England	$83.8	$658.3	$32.9	$143.7	$231.6	$253.5	$665.6	$2,069.4

Sources: USDA Economic Research Service, 1999. United States and state farm income data.
U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 1998. Fisheries of the United States, Current Fisheries Statistics No. 9700. Sept..
USDA, National Agri. Statistics Service. 1999. 1998 Census of Aquaculture, 1997 Census of Agriculture.
Note: Seafood includes value of commercial landings of fisheries plus aquaculture sales.

expenditure declined from 33 percent for all foods in 1975 to 21 percent in 1997 (Elitzak, 1999). This means that a smaller portion of the consumer's dollar went to the farmer and a larger portion went to cover costs for processing, transportation, and retailing.

Table 3.5. Producer's portion of consumer expenditures, 1997.

	Farm value share of retail price	Ratio of retail to farm value
Meat products	35.5 %	2.82
Dairy products	32.3 %	3.10
Poultry	41.2 %	2.44
Eggs	45.6 %	2.17
Fruit	17.7 %	5.65
Vegetables	20.7 %	4.83
Fish and seafood	25.4 %	3.93
Fats and oils	20.8 %	4.81
Processed fruit and vegetables	18.6 %	5.38
Bakery and cereal products	7.4 %	13.51

Source: Elitzak, Howard. 1999. Food cost review, 1950-97, Agri. Rep. No. 780. Food and Rural Econ. Div., Econ. Research. Service, USDA. US Government Printing, Washington, DC.
Note: Author's calculations used for fish and seafood producer value share of retail price, determined by dividing the value of domestic commercial landings, net imports, and farm aquaculture sales by consumer expenditure.

Today's Assessment of Self-sufficiency

Consumer expenditure data from Table 3.3 and estimated retail values of production from Table 3.6 are presented in Table 3.7, along with the resulting net surplus or deficit and the percentage of self-sufficiency. This is an indication of agricultural self-sufficiency in only a narrow accounting sense, because each

Table 3.6. Retail value food production by farms and fisheries, New England states, 1997.

	Meat	Dairy	Poultry	Eggs	Vegetables	Fruits	Seafood
	millions						
Connecticut	$32.4	$235.7	$37.9	$99.3	$126.9	$77.7	$199.5
Maine	$53.5	$296.1	$12.0	$180.3	$647.9	$229.5	$1,148.4
Massachusetts	$25.8	$204.8	$7.8	$17.2	$341.4	$789.5	$908.7
New Hampshire	$18.4	$146.0	$19.4	$6.9	$84.3	$57.1	$52.8
Rhode Island	$4.2	$14.1	$1.4	$2.6	$39.1	$13.5	$308.5
Vermont	$101.6	$1,141.2	$1.6	$6.1	$68.9	$57.5	$0.6
New England	$235.9	$2,037.9	$80.2	$312.5	$1,308.6	$1,224.8	$2,618.5

Table 3.7. Indicated degree of food self-sufficiency, New England states 1997.

	Meat	Dairy	Poultry	Eggs	Vegetables	Fruits	Seafood
	millions						
Connecticut							
Consumer expenditures	$1,060.4	$742.5	$401.9	$81.7	$547.2	$644.9	$245.2
Retail value of in-state production	$32.4	$235.7	$37.9	$99.3	$126.9	$77.7	$199.5
Surplus (deficit)	($1,028.0)	($506.8)	($364.0)	$17.6	($420.3)	($567.1)	($45.7)
Percent self-sufficiency	3.1%	31.7%	9.4%	121.5%	23.2%	12.1%	81.4%
Maine							
Consumer expenditures	$416.9	$291.9	$158.0	$32.1	$215.1	$253.5	$96.4
Retail value of in-state production	$53.5	$296.1	$12.0	$180.3	$647.9	$229.5	$1,148.4
Surplus (deficit)	($363.4)	$4.2	($145.9)	$148.2	$432.7	($24.0)	$1,052.0
Percent self-sufficiency	12.8%	101.4%	7.6%	561.0%	301.2%	90.5%	1191.3%
Massachusetts							
Consumer expenditures	$2,001.4	$1,401.4	$758.6	$154.3	$1,032.9	$1,217.1	$462.9
Retail value of in-state production	$25.8	$204.8	$7.8	$17.2	$341.4	$789.5	$908.7
Surplus (deficit)	($1,975.6)	($1,196.6)	($750.8)	($137.0)	($691.4)	($427.6)	$445.8
Percent self-sufficiency	1.3%	14.6%	1.0%	11.2%	33.1%	64.9%	196.3%
New Hampshire							
Consumer expenditures	$381.7	$267.2	$144.7	$29.4	$197.0	$232.1	$88.3
Retail value of in-state production	$18.4	$146.0	$19.4	$6.9	$84.3	$57.1	$52.8
Surplus (deficit)	($363.3)	($121.2)	($125.2)	($22.5)	($112.6)	($175.0)	($35.5)
Percent self-sufficiency	4.8%	54.6%	13.4%	23.4%	42.8%	24.6%	59.8%

(Continued on next page)

Table 3.7. (continued)

	Meat	Dairy	Poultry	Eggs	Vegetables	Fruits	Seafood
	millions						
Rhode Island							
Consumer expenditures	$323.3	$226.4	$122.6	$24.9	$166.9	$196.6	$74.8
Retail value of in-state production	$4.2	$14.1	$1.4	$2.6	$39.1	$13.5	$308.5
Surplus (deficit)	($319.1)	($212.3)	($121.1)	($22.4)	($127.7)	($183.1)	$233.7
Percent self-sufficiency	1.3%	6.2%	1.2%	10.3%	23.4%	6.9%	412.5%
Vermont							
Consumer expenditures	$196.5	$137.6	$74.5	$15.1	$101.4	$119.5	$45.4
Retail value of in-state production	$101.6	$1,141.2	$1.6	$6.1	$68.9	$57.5	$0.6
Surplus (deficit)	($94.9)	$1,003.6	($72.8)	($9.0)	($32.5)	($62.0)	($44.8)
Percent self-sufficiency	51.7%	829.6%	2.2%	40.6%	68.0%	48.1%	1.3%
New England							
Consumer expenditures	$4,380.1	$3,067.0	$1,660.1	$337.7	$2,260.4	$2,663.7	$1,013.0
Retail value of in-state production	$235.9	$2,037.9	$80.2	$312.5	$1,308.6	$1,224.8	$2,618.5
Surplus (deficit)	($4,144.2)	($1,029.1)	($1,580.0)	($25.2)	($951.8)	($1,438.9)	$1,605.6
Percent self-sufficiency	5.4%	66.4%	4.8%	92.5%	57.9%	46.0%	258.5%

state had its own areas of food and product specialization, with trade providing the wide selection of agricultural products demanded by consumers. The self-sufficiency value is best used as an index to compare states, commodities, and years. While New England produced a surplus of seafood products, it produced less than it consumed for all other food groups. New England faired well in egg production with the retail value of production equivalent to 92.5 percent of egg consumption. With the exception of New Hampshire, each state produced a surplus in at least one product group. Individual states are discussed in more detail below.

Table 3.8 presents the self-sufficiency values from Table 3.7 grouped in the same categories used by Bahn and Christensen in 1975 so that comparisons can be made from 1975 to 1997. In New England, improvements in self-sufficiency occurred in all food categories except poultry and eggs.

Tables 3.9 and 3.10 allow two additional comparisons of self-sufficiency. Table 3.9 presents self-sufficiency results for an aggregation of the seven food groups that are important to New England: meat, dairy, poultry, eggs, vegetables, fruits, and seafood. These were the food groups that were produced in New England in measurable quantities and were relevant to the study of increasing productivity to meet increasing demand. Table 3.10 includes the two additional food groups that were not commonly produced in New England by our farmers and fishers: bakery and cereals and miscellaneous food products. Because New

England states had very little grain production, the aggregate measures of self-sufficiency decline significantly as can be seen by comparing results from Tables 3.9 and 3.10.

Table 3.8. Percent food self-sufficiency index for food groups relevant to producers in New England states, 1975 and 1997.

		Meat	Dairy	Poultry and eggs	Vegetables and fruits	Seafood
Connecticut	1975	1.7%	37.1%	52.0%	14.6%	12.2%
	1997	3.1%	31.7%	28.4%	17.2%	81.4%
Maine	1975	5.0%	109.3%	501.0%	231.6%	661.4%
	1997	12.8%	101.4%	101.2%	187.2%	1191.3%
Massachusetts	1975	1.9%	19.4%	15.7%	18.3%	193.0%
	1997	1.3%	14.6%	2.7%	50.3%	196.3%
New Hampshire	1975	4.9%	73.4%	57.1%	31.2%	22.9%
	1997	4.8%	54.6%	15.1%	33.0%	59.8%
Rhode Island	1975	1.3%	12.0%	13.1%	20.9%	296.8%
	1997	1.3%	6.2%	2.7%	14.5%	412.5%
Vermont	1975	27.0%	747.8%	39.6%	31.2%	0.0%
	1997	51.7%	829.6%	8.7%	57.2%	1.3%
New England	1975	3.2%	62.7%	70.4%	37.4%	176.1%
	1997	5.4%	66.4%	19.7%	51.4%	258.5%

Massachusetts

Massachusetts produced a surplus only in seafood. Massachusetts producers provided only about one percent of meat and poultry purchases. Levels of self-sufficiency in eggs (11.2 percent) and dairy (14.6percent) were

Table 3.9. Estimates of aggregate self-sufficiency for food groups considered relevant to New England producers, 1997.

	Estimated retail consumption in food goups considered	Estimated retail value of in-state production	Amount of farm direct marketing	Adjusted retail value of in-state production	Surplus (deficit) food production as retail value	Total retail value supplied by in-state production	
	millions					1997	1975
Connecticut	$3,723.8	$809.5	$11.0	$784.8	($2,939.1)	21.1%	17.8%
Maine	$1,463.9	$2,567.8	$8.3	$2,543.7	$1,079.8	173.8%	165.7%
Massachusetts	$7,028.5	$2,295.3	$19.8	$2,226.5	($4,802.0)	31.7%	18.8%
New Hampshire	$1,340.3	$384.9	$8.7	$362.1	($978.1)	27.0%	31.8%
Rhode Island	$1,135.5	$383.5	$2.3	$375.9	($759.6)	33.1%	23.3%
Vermont	$689.9	$1,377.5	$6.3	$1,363.8	$673.9	197.7%	168.1%
New England	$15,382.0	$7,818.4	$56.4	$7,665.9	($7,716.0)	49.8%	38.0%

Note: To get adjusted retail value, direct marketed farm sales removed prior to making farm to retail calculation.
Calculations for 1979 by Bahn and Christensen, Regional self-sufficiency in food production-the New England States, J. of the Northeastern Agr. Econ. Council, Vol. VIII, No. 1 April 1979.

Table 3.10. Estimates of overall self-sufficiency for food production, New England states, 1997.

	Total food expenditures (all food)	Estimated retail value of in-state production	Percent food self-sufficiency (all foods)	
	millions		1997	1975
Connecticut	$6,612.1	$784.8	11.9%	13.0%
Maine	$2,599.3	$2,543.7	97.9%	120.6%
Massachusetts	$12,479.9	$2,226.5	17.8%	13.7%
New Hampshire	$2,379.8	$362.1	15.2%	23.2%
Rhode Island	$2,016.3	$375.9	18.6%	15.5%
Vermont	$1,225.0	$1,363.8	111.3%	122.5%
New England	$27,312.4	$7,665.9	28.1%	27.8%

Calculations for 1975 by Bahn and Christensen, Regional self-sufficiency in food production-the New England States, J. of the Northeastern Agr. Econ. Council, Vol. VIII, No. 1 April 1979.

also quite low. Massachusetts producers provided about 33 percent of the vegetables and 65 percent of the fruit consumed. From 1975 to 1997, there was a moderate decline in self-sufficiency for meat and dairy. There was a significant decrease in poultry and eggs. The greatest improvement in self-sufficiency occurred in vegetables and fruit. This improvement is also apparent when compared to a study conducted by Engel (1983), who found 22.7 percent self-sufficiency in fresh vegetables and 22 percent self-sufficiency in fresh fruit. Massachusetts' self-sufficiency in seafood improved slightly.

These findings suggest that food production had been preserved and even enhanced in some sectors in Massachusetts, while there were some declines in animal product categories. These findings are even more impressive when one

considers the fact that agriculture greatly expanded greatly in the green industry, greenhouse and nursery crops. These crops, and tobacco as well, are not included in the food self-sufficiency figures presented here. Overall, in products important to Massachusetts, the level of self-sufficiency improved from about 19 percent in 1975 to nearly 32 percent in 1997. When bakery and cereals and miscellaneous food products are included, Massachusetts' overall levels of self-sufficiency increased from about 14 percent in 1975 to nearly 18 percent in 1997.

Maine and Vermont

Maine produced surpluses of seafood, vegetables, eggs, and dairy. As in 1975, Maine and Vermont had sizable net surpluses in 1997 in the food groups considered most important to New England. While Bahn and Christensen found surpluses in dairy, poultry and eggs, vegetables and fruits, and seafood for Maine in 1975, this study with its separate categories for poultry, eggs, vegetables, and fruits found that poultry and fruit were no longer in surplus. In fact, Maine was only 8 percent self-sufficient in poultry. Conversely, the state fared well in fruit production, with 91 percent self-sufficiency. Maine's high ranking in this analysis, with 174 percent overall self-sufficiency for food groups important to the state (Table 3.9), was consistent with Bahn and Christensen's (1979) estimate of 166 percent, and, as they mentioned, was due not only to Maine's small population but also to its specialized surplus production in potatoes, eggs, and seafood. This excess was high enough to cover nearly the

entire value of Maine's food needs (Table 3.10), 98 percent, although it decreased from the 1975 level of 121 percent.

Vermont's surplus was due to its excess production of dairy products in relation to its relatively small population. The value of Vermont food production was high enough to provide for a surplus above all of its food consumption needs (Table 3.10). Vermont was the only New England state in 1997 that was a net exporter of food products. This 111 percent of food self-sufficiency measure was down slightly from the 1975 level of 122 percent.

New Hampshire, Rhode Island, and Connecticut

Aggregate self-sufficiency for the food groups important to New England improved after 1975 for all states except New Hampshire. New Hampshire experienced continued rapid population growth, with a 42 percent increase between 1975 through 1997. This increased consumer demand resulted in a loss of self-sufficiency in New Hampshire. On the other hand, Rhode Island experienced improvements in self-sufficiency, having been bolstered by increased production of seafood products from both commercial landings and expanded aquaculture. Connecticut had a relatively small increase in self-sufficiency for the aggregate of food groups relevant to New England producers (21 percent in 1997 versus 18 percent in 1975) but no increase in overall food self-sufficiency (12 percent in 1997 versus 13 percent in 1975).

Summary

All states, except New Hampshire, showed gains in overall self-sufficiency for their major agricultural crops. However, when measures of overall self-sufficiency included the final two food categories of bakery and cereals and miscellaneous foods, some states showed an actual decline in overall food self-sufficiency. The New England regional self-sufficiency measure was 50 percent in 1997 versus 38 percent in 1975 for food groups important to New England production. However, it was just 28 percent in both 1997 and 1975 for overall self-sufficiency when the final two food groups were included. In summary, while the value of New England farm production increased from 1975 to 1997, a larger percentage of consumer expenditure went to bakery and cereal products and miscellaneous food products.

Why Self-Sufficiency?

The argument promoting increasing levels of food self-sufficiency has been used in various public policy contexts, e.g., as a justification for farmland preservation, farm market expansion and development, and assistance to specific agricultural industries or commodity groups. Although Christensen had the belief, based on sound economic principles, that complete, or nearly complete, self-sufficiency is not feasible for practical reasons, there were certain commodity groups that gave New England farmers a competitive advantage. By

focusing analysis and policy on self-sufficiency in the specific production areas where states have a comparative advantage, policy makers can ensure that local agriculture is sustained (R. L. Christensen, personal communication, 1999).

An argument could be made that open space should be preserved, in that an aesthetically pleasing pastoral landscape of open vistas of agricultural land attracts tourists, and their dollars, to the region (Krieger, 1999). This point of view makes the claim that tourists from metropolitan areas want to experience the authenticity of beautiful rural areas, with their naturally diverse and ecologically healthy landscapes. Urban and suburban visitors are therefore supportive of designating tax dollars for the preservation of rural open areas in the countryside to prevent urban encroachment. Such tax investments ensure that tourists will continue to have desirable vacation destinations where they can enjoy spending their money. In short, the preservation of open land, and particularly farmland, in rural areas provides important monetary benefits to the regional economy by offering an invaluable, satisfying experience to visiting consumers.

Consumers choose products primarily on the criteria of freshness, quality, and appearance of the product (Holm, p. 43-46). Other very important factors to consumers in choosing where to shop are the cleanliness of the store and the variety, selection, and price of products offered. Many consumers are willing to pay more for locally grown produce; in fact, support for local farmers is often

cited by consumers as a reason for buying a particular food product (Wilkins, 1995, p. 164).

Agricultural policy makers should make achieving economic development a primary goal with increased food self-sufficiency as an outcome rather than to make the attainment of self-sufficiency a primary goal. Green (1998) outlined agricultural development goals as economic (creating an increase in economic security), environmental (protecting and enhancing ecological systems), and social (strengthening community capacity). There are many valid reasons to support regional economic development. In general, the arguments for local production for local consumption include: the economic multiplier effect and spin off of economic activity; increased tax receipts for the public sector resulting in increased money for community development, schools, and preservation of the environment; less vulnerability to outside events inasmuch as a diversified local economy is not as negatively affected by catastrophe elsewhere; and the fact that local ownership removes the corporate threat of an industry's relocation, thereby resulting in the establishment of improved environmental and labor standards (Lee, 1991).

The word self-sufficiency as used in this analysis has ignored the factor of trade and contrasted overall production with overall consumption to calculate an index. By definition, self-sufficiency connotes self-reliance, with the trade-off of having more local production but less trade with outside areas, resulting in an

overall reduction in total goods and services consumed. Economists should direct development policy so that policies will balance the benefits of specialization and trade with the cost of preserving the natural environment and having a limited diversity of economic activity. Massachusetts has done reasonably well as it retains a link to its agrarian past without sacrificing gains from trade. Since complete, or nearly complete, self-sufficiency is not practical or even feasible without sacrificing the variety of foods and products consumers now enjoy, policy makers should continue to promote trade, assist New England farmers in finding the most profitable operations, and engage in the public policy debate by promoting the value of open space and other amenities that are difficult for farmers to capture in the price of their products.

Conclusion

While it is true that New England still depends on outside regions for most of its food supplies, the fact that New England food producers have consistently met consumer demand for regional foods and products is encouraging. The notable success of a number of food commodities bodes well for the future in the quest for the improvement of financial solvency for individual farms and the achievement of higher overall levels of food self-sufficiency in New England. By estimating self-sufficiency measures, economic analysts can continue to assess growth in the agricultural economy. Having periodic assessments of how agricultural sectors are doing available for study, agricultural policymakers will be

better able to recommend policies that will enhance economic competitiveness for farmers in the marketplace

Effective policies that support farming are vitally important. Agriculture has made important contributions to the quality of life in New England since Colonial times. As in the past, a healthy agricultural economy over the next decades will contribute significantly to the vitality of the general economy in New England.

The data provided by an analysis of aggregate self-sufficiency measure indicate the well being of the agricultural economy. The objective was to make an accurate assessment of the current state of the agricultural economy in New England. The findings of this research were mainly positive, indicating that regional food production consistently kept pace with increased consumer food demand for the New England region as a whole with an overall self-sufficiency in 1997 matching that of 1975 at 28 percent. In addition, the region made improvements in those food products important to New England producers, except for animal products. This revelation that New England producers continued to be economically viable is gratifying news for the general public and for advocates of agricultural development and reform.

CHAPTER IV

SUMMARY, DISCUSSION, AND IMPLICATIONS

Public Perceptions and Trends in U.S. Agriculture

A common public misperception nowadays is that Massachusetts agriculture has declined and will continue to do so. Many believe that "commercial agriculture will vanish entirely from Massachusetts…, except for local specialties such as cranberries and horticultural products" (Platt et al., 1975, p. i). Some assume that the loss of farms and farmland is inevitable but might be reversed somehow only by making a large public investment to save them. Others wonder if it's even possible to preserve agriculture. The extent to which agriculture can be protected in the future is unknown, resulting in understandable confusion about the current and future state of agriculture. What changes have occurred over the last century? What is the actual state of agriculture today? What can be done to support agriculture in the future?

Public perception has been shaped by not only what is happening in Massachusetts but also what is happening throughout the nation. Nationwide, the number of U.S. farms has decreased from about 7 million in the 1930s to fewer than 2 million today, and 300,000 farms have been lost since 1979 (USDA, 1998). As a result, traditional family farming is at risk. Ownership and control

over agricultural assets are increasingly becoming concentrated in fewer and fewer hands, resulting in the loss of open, competitive markets at the local level. Farmers operating in a market of many small, independent competing sellers and a few large powerful buyers have little or no control over setting the prices of their products. "Market power is what enables a firm to enhance prices to buyers, to extract price reductions from its products suppliers, and to subdue rivals" (Rogers, 2001, p. 6). The concentration and integration of corporations purchasing commodities from farmers have meant that there are fewer markets in which to sell commodities. For instance, four corporations control 80 percent of the national beef processing market. "A similar pattern, but arriving a bit later, has occurred in hog slaughtering, where the consolidations have largely been in the 1990s" (Rogers, p. 29).

Consolidation of the agricultural input suppliers is occurring by both vertical and horizontal integration. Aggressive chemical companies recognize opportunity for profits by purchasing seed companies. Consequently, farmers have fewer choices when purchasing inputs. The farm share of value added to agricultural products fell steadily from 21 percent in 1910 to only 5 percent in 1990, as the input and marketing sectors increased their share of consumer dollars (Smith, 1992a). Technology and market changes have shifted economic opportunities from on-farm production to off-farm agricultural input and marketing sectors. Marketing in the livestock industry has become very difficult for the small grower. Today, livestock marketing is done through contracts, and public

markets have disappeared. Since there is no open bidding process without the public markets, prices have dropped for farmers. They are less able to earn fair prices; on the other hand, the companies are gaining higher levels of control over feed and management practices (O'Neil, 1997). The increased concentration among food processing companies, loss of competitive markets, and reduction of price stabilization puts farmers at increased risk (USDA, 1998).

Farmers have found themselves in a cost/price squeeze: input costs have been going up, while typical market prices have remained the same, have sometimes even decreased, or have increased less than the rising cost of production. When farmers buy and sell to industries that are organized to use contractual coordination, market discrimination, non-price competition, product differentiation, bargaining power and politicization of the economic process, farmers are pressed to become similarly organized to counteract this pressure (Harrington, 1979). The agricultural production sector has been under increasing pressure to change its structure from pure competition toward monopolistic competition, oligopoly, or even monopoly. Also, even though farmers can form cooperatives, differences in size among the members make it difficult for them to form a cooperative (Rapp, 1996). Although small farms make up 94 percent of the nation's total farms, farmers of these operations receive only 41 percent of all the agriculture receipts (USDA, 1998).

In summary, farmers face several choices: become larger to take advantage of the economies of scale; become a contract producer for an integrated corporation; form a cooperative; find strategies to reduce costs as much as possible, such as efficiently using fertilizer in combination with cover crops to boost fertility or using intensive grazing instead of machine harvested feed; produce a higher value product, such as organic or specialty products; sell direct to the public to get a better price, recouping some of the dollars normally taken by distributors and marketers; or add value to the products through on-farm or cooperative processing. The fact that so many farmers have taken the "become-larger" route and so many others have accepted restrictive contract farming arrangements that make them akin to employees of vertically integrated corporations have worked to the detriment of the other farmers who do not make such changes and who find themselves at a growing competitive disadvantage.

Government Policy

Agricultural reform, including family farm preservation, has been the object of study and government policy intervention since the 1930s. The shift within the agricultural system from a family farm model to an industrial production model has led to major restructuring of the farming sector, not just a decrease in the number of farms and amount of farmland. This historical shift in agriculture has occurred in response to changes in both technology and marketing as well as in the implementation of government policies.

There are many unintended effects of public policy on agriculture (USDA, 1981): tax policies have been biased toward larger farmers and wealthy investors; technology (the result of publicly funded research and education) has had a major impact on agricultural structure; changes in the marketing system have affected agricultural structure so that the marketing system has become increasingly oriented to serve the larger producers; and farm commodity and credit policies have benefited larger producers. Public gain, the lowering of prices with the increased food supply resulting from farm expansion, is shrinking. The rural economic decline that is a by-product of these diminishing profits is a serious negative outcome, proving that farm expansion per se is a problematic endeavor. There is no apparent reason for public-policy makers to encourage farm expansion beyond a size that is efficient. Instead, policy should endeavor to help smaller and mid-sized farms (USDA, 1981).

Technology development and market consolidation have shifted farming activities away from the farm and reduced profit margins for farmers, requiring them to increase scale of production to maintain farm net income. Government policies have had dramatic impacts on technology development. One estimate is that three fourths of the increase in agricultural productivity has been due to public investment in agricultural research and development (Shane et al., 1998). "Technology has had the greatest effect on farm structure over the long run; thus, funding of public research and extension has been the most important policy

variable" (Babb, 1979). Policies that support research and development of industrial technologies for the input and marketing sectors have promoted expansion, specialization, and concentration (Smith, 1992a). Policies that support commodities markets and provide tax incentives for capitalization have encouraged farm expansion (USDA, 1981).

In their analysis of commodity price support systems, Faeth et al. say that "...government costs can be reduced and the economic value of agricultural production to society can be greatly increased by removing the distorting effects of baseline policy and encouraging farmers to respond to market signals" (1991). The recent passage of the 1996 Federal Agriculture Improvement and Reform Act (FAIR) decoupled planting decisions from payments and instead provided "transition" payments scheduled to cease in 2002. This is the beginning of the end of government intervention in commodity markets, perhaps to the benefit of the small farmers (USDA, 1998). However, much of FAIR is being rethought as farmers struggled under its policies. The new farm bill debate will likely return to earlier ongoing concerns.

Government policy will continue to be very instrumental in shaping the kind of agriculture that takes root in the future. While the 1997 Census data indicate that Massachusetts is no longer losing farms, it continues to lose farmland (USDA, 1999b). What can be done to halt the loss of agricultural land and to preserve present holdings? This, and other unanswered questions

concerning the changes that are taking place in the structure of agriculture and the economic consequences of those changes, present dilemmas to be solved by agricultural professionals. They play a central role in analyzing policies, evaluating the economic impacts of new technologies, designing new marketing arrangements, and constructing research and education programs. They can facilitate change so that the development of improved market access, farmers' cooperatives, and appropriate technology will help the smaller farms in New England compete in the new economic order, benefiting both farmers and consumers.

Massachusetts Agriculture and the Reversal of Trends

The negative belief that Massachusetts is losing its agriculture persists, perhaps due to the fact that many people continue to notice that more and more land is being developed by the private sector. However, loss of land to development is but part of the picture of changes in Massachusetts agriculture. Even more significant is how farmers have been responding positively to challenges in new, innovative ways. The profile of Massachusetts farmers has changed to include part-time operators living in dual income households. Many farmers have become more intensive in their operations, by growing more high-value crops and using more direct marketing to get higher market premiums. With the continued expansion of sustainable farming practices, some farmers are relying less on outside inputs and more on intensive land management.

Although Massachusetts is small in size in comparison to the larger size of other states, it ranks among the top seven states in farm direct-marketing sales, and it ranks second in the value of average direct-marketing sales per farm, only exceeded by Rhode Island. The increase in retail farmers markets and other direct-marketing strategies such as membership farms allow many farmers to take back some of the profits of these marketing activities. To sum up, many fundamental changes in the structure of agriculture have led to growth in farming activity and a stronger, more stable, regional agricultural economy.

To understand the reasons why the trend toward loss of farms has stabilized and even reversed, one must understand the state governmental policies supportive of agriculture that began to be implemented in 1976 and continued through the 1980s. "In the middle of the 1970s … programs to effectively halt further decline [in the state's agriculture were] broadly demanded and supported" (Foster and MacConnell, 1977). The frameworks for public policy centered on taking action to protect prime soils, create open marketing opportunities, provide financing for farm business and food processor expansion, and manage pesticides and manure to alleviate environmental problems. As of 1988, $50 million had been invested in farmland preservation; $400,000 per year in a "Massachusetts Grown…and Fresher" campaign to promote local agriculture to consumers; $1.4 million in Integrated Pest Management and biological control grants; $220 million in development loans for farmers, fishers, food processors,

and food distributors; $5 million of annual funds for increases in Extension Service; and $400,000 in market development grants. (Dukakis et al., 1988)

Interested consumers as well as agriculture advocates in Massachusetts are concerned about agricultural preservation in their state. They appreciate all the amenities that a vibrant agricultural economy provides. They object, however, to the hidden costs of federal taxpayer dollar subsidies for larger farms as well as the potential environmental cost associated with transporting food long distances; to the large scale agricultural system's heavy use of fossil fuels and chemicals; and to the use of methods that cause soil erosion and pollution (National Research Council, 1989). Many citizens are concerned about concentration in the food system and the negative effect it will have on consumer choice and prices in the food system. The general public is beginning to realize that agricultural enterprises create jobs. Farm businesses have a multiplier effect on the local economy from dollars generated through direct agriculture employment and spin-off enterprises created through the increased economic activity required to support agricultural businesses (Lindall and Olson, 1998).

While it's true that there have been serious decreases in the amount of farmland in Massachusetts, visitors to farms in the Commonwealth will surely observe significant changes in the structure of agriculture. First, they will notice that farmers are using innovative marketing strategies such as the development of community supported agriculture projects, cooperatives, farmers' markets, and

niche products. Next, visitors to farms will observe that farmers are using creative ways to reduce their needs for off-farm inputs and relying on farm resources such as rotational grazing, seasonal dairying, on-farm composting, Integrated Pest Management, and cover cropping to maximize soil fertility. Finally, visitors to farms in Massachusetts will learn that farmers have taken advantage of government programs such as Agricultural Preservation Restriction payments and Farm Viability Enhancement business planning (Appendix).

In summary, anyone who visits farms in Massachusetts will realize that the state is not losing, but is actually reviving, its agriculture. Indeed, a new model of agriculture has been evolving, resulting in a thriving agricultural economy that is continuing into the new millennium. Although residents of Massachusetts can appreciate the success of the "new agriculture," they most likely will still have some serious concerns. An important issue is whether or not Massachusetts agriculture is growing in appropriate ways as much as possible. Some helpful strategies to promote agriculture in the Bay State include increasing market opportunities, developing research on small-scale farm-based production technologies, and teaching farm business management and marketing skills. Public money is needed to support these endeavors as well as other key strategies. The preservation of agriculture in Massachusetts is warranted because of the innumerable contributions it provides for the public good. The community reaps the cultural, environmental, and economic benefits of a viable agriculture.

Implications

Agriculture in Massachusetts is not declining; on the contrary, it is evolving into a new, restructured model that promises hope for the future. To the credit of public policy-makers and others, agriculture in the Bay State has been revitalized. Nonetheless, much has yet to be done to further preserve agriculture.

The state of Massachusetts has lost a considerable amount of farmland to development in recent years. As Massachusetts has become increasingly urbanized, concern about the negative impact of the decrease of its farmland has been at the forefront of public policy makers (Foster and MacConnell). Farm loss has been claimed to have detrimental social, environmental, and economic outcomes. Water, soil, and air quality can be denigrated by development, having ill effects on both wildlife and humans. Another unfortunate outcome is that some farmers have been forced out of business and have had to switch to other vocations. The need to preserve the amenity value of agriculture and open space captures the attention of public policy makers. They perceive the economic threat of a loss of tourist dollars resulting from the loss of picturesque farmlands. Economic incentives may have prompted action by the Massachusetts legislature to fund programs to curb loss of farmland. Such programs came into being in the late 1970s and were implemented through the 1980s and 1990s. While it is beyond the scope of this dissertation to evaluate

the impact of these land preservation programs on farm viability, the study has been able to identify data that clearly signal an improvement in the entrepreneurial success of Massachusetts farmers, despite the problems posed by loss of farmland.

The Census shows that the Massachusetts agricultural economy is the strongest it has ever been, in spite of farmland loss. There has been a substantial increase in the number of small farms. Farmers on the urban fringe use survival strategies such as focusing on high-value production and direct-to-the-consumer marketing (Lockeretz, 1987). It is certainly an erroneous myth that it is too late for Massachusetts agriculture to recover from the economic downturn in the agricultural sector that occurred prior to 1974. Certainly, the data of the 1997 Census shows that the Massachusetts agricultural economy made a remarkable recovery.

The data present a positive picture of successful farmers, implying that farmers have improved their decision-making in production, marketing, and financial management. A reasonable assumption is that farming in Massachusetts is changing in such ways that its farmers will not just survive but also have opportunities to prosper in the twenty-first century. Massachusetts agriculture is a viable industry for the Commonwealth and promises to continue its significant contribution to the state's economy in the future.

APPENDIX

A MASSACHUSETTS FARMER ADAPTING TO CHANGE

Introduction

This case study is a representative example of an innovative farmer who has redesigned his business to respond to changing consumer demands and interests. As a result, he has achieved considerable financial success. From this detailed case study, one can see traditional "Yankee" virtues in action. This is demonstrated by an individual who set high goals, worked hard to reach these goals, and found creative, yet practical, solutions to problems posed by an increasingly complex consumer economy.

While a single case study cannot prove conclusively that farmers throughout the Commonwealth have become similarly innovative, it can provide a deeper understanding of how one individual farmer personally dealt with formidable challenges to keep a generations-old farm economically solvent. Indeed, the farmer's business is flourishing. One can conclude that the successful strategies he employed did not evolve out of a vacuum but were developed within a cultural context of perseverance, integrity, and ingenuity. One can also infer that this farmer worked in concert with others such as

business consultants with up-to-date knowledge and with agricultural extension consultants with expertise in production and marketing.

Like other business owners, the farmer has not been afraid to take risks but has made considerable investments to make his business competitive in the new economy. The details of other prosperous farm businesses in Massachusetts may differ, but all of the successful farmers most likely share a willingness to make radical changes in their businesses that benefit their own operations, the regional economy, and of course the national economy. To sum up, the following case study does not assert that all farmers in New England are responding to change in similar ways but shows, with the support of illustrative details, how one farmer has responded to today's changing landscape of agriculture in the state of Massachusetts.

This case study farm was selected because it represented an innovative, successful venture involved in an agricultural program with significant potential for growth and impact on Massachusetts' food and agriculture industries. The case study farmer participated in the Massachusetts Department of Food and Agriculture's Farm Viability Enhancement Program (FVEP). First, an overview of the goals of the FVEP will clarify its influence on the Massachusetts economy. Then, an examination of the history of the farmer's enterprise, especially recent changes under the FVEP that enhance the farmer's ability to succeed in an

increasingly urban environment, will illustrate one farmer's adaptation to changing economic and social conditions in Massachusetts agriculture.

The Farm Viability Enhancement Program

The Massachusetts Department of Food and Agriculture's Farm Viability Enhancement Program (FVEP), now in its fifth year, was conceived as a means of preserving the financial viability of farms whose land is threatened by urban encroachment. Farmers participating in the program work with FVEP consultants to create and implement comprehensive farm business plans. The plans are intended to improve farm income through such modifications as improved management practices, diversification, direct marketing, value-added initiatives, and agri-tourism. In return for implementing designated components of the plans and placing farm acreage under agricultural, non-development covenants, participating farmers receive funding of up to 20,000 dollars for a five year land restriction covenant and 40,000 dollars for a ten year covenant. The relatively short-term deed restrictions of the FVEP covenants are in contrast to the permanent deed restrictions of Agriculture Preservation Restriction (APR) covenants, which do not require farmer implementation of financial viability business plans. The criteria used by the FVEP in selecting farms for its program are, in order of importance:

> (1) the degree to which urban encroachment or financial instability pose a threat to the continuation of farming;
>
> (2) a fairly high number of acres to be placed in covenant;

(3) the degree of farm diversification;

(4) the length and depth of the owner's agricultural experience;

(5) the ability to meet environmental objectives; and

(6) the suitability and productivity of the land for agriculture.

The FVEP currently has 105 participating farmers and over 11,000 acres under covenants across the state of Massachusetts.

The Case Study Farmer

The farmer selected for this case study manages a family farm of 150 acres that has been in operation for three generations. He has responded to financial pressure of low net farm income, perceived consumer demand and public interest, and addressed a need for risk management strategies by diversifying agricultural production and initiating innovative changes in marketing to meet the demands of relatively affluent suburban consumers. He has participated in both APR and FVEP, using the program funds to increase and diversify on-farm retailing, analyze opportunities, and improve management infrastructure. Finally, he was a farmer whom the FVEP director believed would be agreeable to and capable of answering the researchers' detailed questions. Interviews with the farmer in July 2000 and a review of his business plan and financial statements provided the information for this case study.

Background and History of the Farm

The farm's most outstanding asset is its impressive land, consisting of picturesque rolling meadows, open fields, orchards, forest, and marshland. Its pristine beauty has been preserved for hundreds of years. The lay of the 150 acres of open land offers a bucolic setting within the surrounding suburban upscale subdivisions. Located in an affluent community with new home sales in the $300,000 to $600,000 range, the farm provides a soothing image of an authentic traditional New England farm with a farming legacy going back to Colonial times. The farm's appeal to the public may be that it seems to be a sylvan natural oasis surrounded by suburbia. Visiting the farm provides customers welcome relief and relaxation from the stresses of their demanding lifestyle in the city and its suburbs.

The present farm owner's grandparents purchased the farm in the early 1900s as a homestead of 150 acres. His father operated a commercial dairy and, later, a truck farm until he suddenly died in middle age. Only one of his children, a son, became interested in continuing the farm. He had gone away to college outside of New England, hoping to escape farm life by studying architecture. When he returned home after completing his college degree in biology, he found his mother trying to keep the farm in business by continuing the truck farming operation and expanding into a small pick-your-own operation with 150 apple trees. The farm had begun to decline since his father's death; hay

fields were becoming over-grown and buildings and equipment were in disrepair. He decided to take over the operation of the farm. Realizing that he would need security of ownership if he were to devote his life to running it, he proposed that his grandfather and mother include him as one of three owners of the property.

Twenty-five years ago marked the beginning of the son's takeover of the farm operations as its new third-generation farmer. He started his work on the farm by maintaining the hayfields to sell hay and the woodlots to sell cordwood. Because these enterprises produced little income, he began to consider the possibilities for expanding the farm's income in its New England setting. He believed he had three options to increase income: managing horse stables, expanding the orchards, or operating greenhouses. Since he was most interested in orchards and believed his skills would match orchard management, he bought 300 trees to enlarge the fruit production enterprise.

Several years later, the farm owner sold the development rights on approximately two-thirds of the land to the state APR program. He later had reservations about selling the development rights because of an unexpectedly high income tax bill on the APR transaction, and his belief that the land had been assessed lower than its true market value. Nevertheless, he was able to invest some of the APR money into construction of a farm stand. Initially, he sold mostly apples and apple pies at the farm stand. After about five years, he also sold Christmas trees and later added a bakery to the farm stand.

A financial breakthrough for the farm occurred after the farm owner followed a friend's suggestion that he initiate an educational program on the farm. During the first year of the program, hundreds of school children, each paying a fee of five dollars, visited the farm, launching the farm into a new stage of development through the promotion of agri-tourism.

Organization of the Farm

The farm's management structure in 1998 consisted of two tiers. The farm owner was at the top, serving as CEO and marketing director. Under him were the financial manager; farm manager and assistant farm manager who together oversaw farm production and pick-your-own activities; a bakery and farm stand manager; and an activities and events manager. The operations of the farm consisted of the following departmental areas: fruit, vegetable, and Christmas tree production; farm stand retail sales; the bakery; educational programs; special activities and festivals; and financial accounting.

Changes in the farm's structure had been made over a period of years. The organizational design of the management team and the implementation of the individual ventures of each of the managers were apparently successful, resulting in gross revenues totaling over $900,000 in 1997. Yet, the farm owner felt the need to apply for farm management assistance from the FVEP in 1998 to

further increase his farm profitability. Even though the farm's gross revenues had increased substantially in the late 1990s, increasing by $75,000 in 1996 and nearly $200,000 in 1997, the farm's annual net income still remained too low, averaging under $2,500 for the years of 1995, 1996, and 1997. In spite of the promising financial growth of the farm, the farm owner felt frustrated by the still to modest profit margin. Recognizing the need to improve the farm's business operations, he turned to the FVEP for guidance from its specialized management consultants, who would create a farm viability business plan. The farm owner agreed to place a five-year development restriction on his land and was given $20,000 to help implement $55,000 in changes he agreed to make based on the suggestions made by the FVEP's team of consultants.

FVEP Recommendations Made in 1998-1999

A recommendation made by a FVEP consultant was to increase the capacity for stronger teambuilding of the farm's departmental managers. Even though the farm owner possessed excellent interpersonal skills and had a regular presence on the business site, he often became overwhelmed by the barrage of daily problems for him to solve within each of the four main areas of farm operations. A recommendation made by the FVEP consultant was "to establish an organizational structure which reduces the farm owner's day-to-day decision making responsibility and makes each operational area responsible for its own profitability." This recommendation was made so more accountability could be

assigned to each of the departmental area managers, enabling the farm owner to spend the majority of his work time on the broader executive responsibilities instead of spending most of his time each day solving problems and performing mundane duties. The new organizational structure would also endow each manager with increased leadership opportunities to make decisions aimed at improving the profitability of his or her own operation. The goal was for the managers not only to strive to make adjustments in their operations guided by the feedback gained from financial reports but also to allow managers to have "a primary role in determining what information they could use best." The managers were to be empowered to take responsibility for such matters as the hiring of personnel and staff, setting schedules, determining prices and sources of goods, and creating displays, with the goal of achieving maximum profitability.

Another strong recommendation made by the FVEP consultant was to hold weekly "Leadership Team" meetings chaired by the farm owner. The meetings were to be conducted formally by setting a specific meeting time and place, by being standard in format with a printed agenda, by being limited to no more than ninety minutes in length, and by being considered a high priority for the managers, whose attendance was mandatory. The purpose of these meetings was stated as the opportunity to review the budgeting process; to share financial reports; to coordinate such tasks as scheduling, staffing, and training; and to discuss opportunities and problems in the farm's operation.

An additional recommendation was to improve training procedures for both the managers and the largely part-time work force. The managers were to be trained to have more personal authority and take greater responsibility for their own areas, to learn how to utilize the findings of financial reports, and to be taught how to use computers more extensively. The managers as leaders of their units were to be made responsible for overseeing the standardized training of the high-turnover, part-time employees. A trainer from each department of the farm was to be assigned to conduct a consistent training protocol for new employees, who were to demonstrate their knowledge and skills in a post-training review.

The consultant also made recommendations to renovate and reorganize the farm stand. The farm stand sales of produce and retail items were overseen by a farm stand manager, and bakery sales were overseen by a bakery manager. The farm stand occupied a small space that the consultant believed could be expanded and improved to provide a better sales environment for customers. The bulk of the produce section was the four types of fruit; apples, peaches, pears, and cherries grown on the farm while also offering pumpkins in season and a select number of farm-grown vegetables. The FVEP consultant recommended that an outside retail sales professional with roadside stand expertise analyze the profitability of the product mix and to emphasize the farm's mainstay of fruit production by adding other fruits, such as melons, and fruit products, such as jams and jellies. The consultant also recommended

maximizing merchandizing effectiveness by introducing high profit margin commodities such as specialty houseplants and seasonal goods tied to holidays such as Halloween and Christmas. Products were to be marked with easy-to-read price stickers and arranged more attractively in eye-catching displays. In addition, the consultant recommended that the traffic flow be improved by rearranging the display shelves, that employees wear company shirts for easy identification, and that security concerning shoplifting and cashier responsibility be reviewed and improved.

The bakery represented one of the more profitable areas of the farm's operation. By following the recommendations of the FVEP consultant, the bakery manager could make the bakery even more profitable by raising prices to be more in line with that of competitors and by featuring fresh seasonal farm fruit in bakery products to highlight the farm's major asset of fruit production.

The FVEP consultant recommended reviewing labor costs in the farm stand by checking to see if the work schedules of employees appropriately matched the customer attendance on days of the week when sales were the highest. Naturally, sales were the highest on the weekends, but the consultant stated that a decision could be made to close the stand on the day or days that showed the least amount of sales by making an analysis of the revenue fluctuations from day to day over a period of time.

The consultant made two final recommendations to improve the farm's communications systems. One recommendation was to install a recorded phone answering system to handle routine inquiries, and to direct calls respectively to the key booking functions. The other recommendation was to create a web page that would provide directions, a calendar, a listing of special seasonal farm activities, and information about general events and programs.

Structure of the Farm Business in the Year 2000

Marketing and Revenues

The farm business today has diversified and expanded considerably. The relative proportions of revenue sources are depicted in the figure below. "Pick-your-own" fruit and pumpkins and "choose-and-cut" Christmas trees remain major portions of the farm business, comprising 20 percent of the current million dollars in sales revenue. There are about five acres of strawberries, peaches, and nectarines, a little over one half acre each of pears and tart red cherries, about twenty-five acres of apples (early, mid-season, and late varieties), fourteen acres of Christmas trees, twelve acres of pumpkins, and one half acre of cut flowers. The remainder of the farm consists of approximately a dozen acres of hayfields that are rented out; seventy acres of woodland, ponds, and wetlands; and ten acres of roads and parking. The farm owner also maintains a heritage

orchard on the farm consisting of over two hundred trees of ten different antique apple varieties. These "gourmet" apples are sold at premium prices.

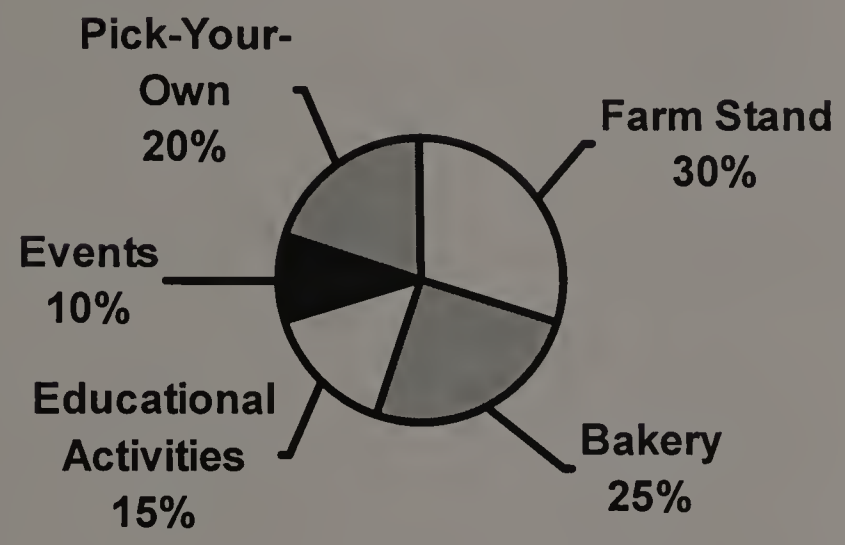

Figure A.1. Sources of revenue for the case study farm, 1999-2000.

The farm stand and the on-site bakery now generate the largest portions of farm revenue, 30 percent and 25 percent respectively. The stand offers flowers grown on the farm, some bought-in produce and food products, gift items, coffee, beverages, and fresh baked goods that are reasonably priced and that feature seasonal fruit grown on the farm. While the high demand for the farm's bakery goods has already made the bakery quite successful, the rest of the farm stand offerings still have potential for expansion. Areas for customers outside of the farm stand have been outfitted to encourage people to spend time relaxing on the farm. There are picnic tables, a children's play area, a covered patio, and walking trails. Farm grown vegetable sales were eliminated from the farm stand

this year because the farm manager did not have sufficient expertise in vegetables and was more productive focusing on fruit production for pick-your-own sales. Another reason for no longer growing vegetables was their previous poor sales record in 1999, under $1,500.

The farm is quite proactive in seeking agri-tourism revenues. Entertainment activities and events and educational programs generate substantial revenue for the farm, about 25 percent of total revenues. These activities, events, and programs include a viewing and petting zoo with feed available for purchase, tractor-drawn hayrides, birthday parties, weekend festival days to match the seasonal availability of crops (such as a strawberry festival and a peach festival) and holidays (such as Halloween and Christmas), summer writing and craft/nature camps for elementary school children, story hour for young children, and educational group tours on planting, bee keeping and wildlife.

The farm owner has made improvements in the layout of the public areas so that the fenced children's play area leads to the animal facilities. In the animal area are coin-operating livestock feed purchase stations, where visitors can purchase a handful of feed for a quarter. Eight to nine thousand dollars a year in revenues are generated through these quarter sales of feed. After walking through the animal area, farm visitors then walk on trails that include placards posted along the way featuring a children's theme. The children's theme trail

opens to a cool grove of pines, ideal for picnics and gatherings, and continues on to the heritage orchard.

The farm owner has also renovated equipment and buildings and offers rental sites for private functions. He outfitted the hay wagons for hayrides with covers after calculating that saving just one day's revenue lost due to bad weather would more than pay for the covers. He also converted the farm's grand old historic hay barn to accommodate educational and entertainment events. In it there are lofts set up for story telling and birthday parties and a bee and honey room. The farm owner rents outdoor sites with tents or canopies to customers for their private business and family functions and facilitates hiring local entertainers and caterers for these functions.

Financial Management

Of all the tasks the farm owner must do, financial management is his least favorite. He recognizes this as one of his weaknesses. His financial administrator has kept accounts using the Quickbooks record keeping system. The farm owner has been working with an FVEP consultant to separate the accounts into departments so that he can review the profitability of the different areas of his farm business and so that each manager can take on more accountability for his or her area.

The farm owner has kept both the educational/entertainment activities and the pick-your-own operation financially viable by charging relatively high prices. He has been successful at obtaining upscale prices at the well attended educational and entertainment activities. For example, school tours are priced at six dollars per student, birthday parties at $150 for up to ten children, plus $10 per person above ten participants. Charging somewhat high fees has kept this department of the farm profitable. He has also kept the pick-your-own operation profitable by pricing apples at $10 per peck and $15 per half-bushel, peaches at $1.29 per pound and Christmas trees at $40 each. In the bakery, pricing for bakery items has not been as high as it could be compared to that of markets in the area.

The farm owner took a calculated financial risk in broadening the scope of his farm enterprise from what it was when he first took over the farm to what it has become in recent years. He had realized that generating sufficient sales to prosper as a traditional wholesale farmer with a somewhat modest land base did not seem very feasible for him, so he adopted several non-traditional marketing strategies to enhance profits. To minimize his financial risk, he created diverse sources of income. By direct marketing with pick-your-own and the farm stand, engaging in value-added enterprises such as those offered by the bakery, and selling the farm experience through educational and entertainment activities, he has been successfully able to keep the farm in business. With expanded

marketing and diversification and improved management, he hopes to increase the farm's financially viability in the future.

Employee Management

The farm owner recognizes the importance of having high quality employees. Even though he considers people skills to be his major managerial strength, he acknowledges that dealing with employee problems is one of his biggest headaches. The labor market is tight, making the pool of qualified applicants small. Seasonal employees number up to sixty during the peak season of fall festivals and pick-your-own activity. Having experienced the difficulties of seasonal employees who work a season but do not return in subsequent seasons, he has expanded the farm stand season each year by moving back its original opening in May to March in order to decrease employee turnover. Fortunately, the farm owner has skilled, experienced, and committed personnel in the key positions. The management team working under the farm owner now includes two half-time coordinators, one for education and the other for activities, and four full-time managers, one for the farm stand, one for the bakery, one for farm production, and one for financial management and business administration. The farm owner meets with the six members of his management team as a group every other week and individually in alternate weeks. He has found some difficulty in finding dedicated employees who will stay with the business because the lower pay scale and benefits offered to farm employees

cannot compete with the higher pay scale and benefits provided by professional employment in the area. He has been fortunate in retaining the financial manager for almost a decade and the farm manager for almost five years. He also found it more profitable to outsource many jobs such as pruning and machinery repair that were formerly done by the farm manager and assistant farm manager team.

Options for the Future

The farm owner, as its CEO, is responsible for determining the overall direction of the farm in the future and for communicating this to his staff. He would like to increase profits by boosting sales with expanded activities and cutting costs with more efficient operations. He also wants to continue to encourage the members of his management team to be less dependent on him for day-to-day operations by delegating more authority to them. To do this requires separate financial accounting of each departmental area. One example of department-based decision-making that is dependent on financial analysis is the decision to expand the pick-your-own production. Another example is the decision to expand the farm stand by buying additional vegetables, plants, products, and displays. Both decisions are best made by the manager in charge after analyzing financial reports to determine feasibility.

Precise financial analysis of each of the operational departments is difficult to accomplish because the areas, although conceptually separate, are in fact very much interconnected. For instance, flowers produced on the farm are sold through the farm stand and educational and entertainment activities are very much dependent on the pick-your-own fruit operation as well as pumpkin production. Another example is that special events and festivals bolster retail sales of bakery goods. In short, the departmental areas should be analyzed for their financial accountability, but with the understanding that each department's operation complements the others, so decisions made to increase or to decrease one department's function will ultimately affect all of the others, positively or negatively. For each manager to merely review his or her own department's financial accounts is not enough to make appropriate expansion or reduction decisions. All of the departmental managers need to use a team spirit approach when doing departmental analysis, for they are all working toward the common goal of overall success for the business.

To improve working conditions for employees in the farm stand, the farm owner would like to add three months of operation in the winter to make the stand a year round stand. By providing stable year round employment opportunities for more workers, the farm owner will be better able to retain part-time employees and cut costs for employee training and retraining.

The farm owner plans to install an ice cream stand to boost profits during the slower summer months by selling ice cream. In contrast to the high cost of cider-making equipment and its sizeable space requirements, the cost of ice cream making equipment and space for the operation are moderate. Profit margins for ice cream promise to be excellent, as there are constant streams of would-be ice cream customers involved in the educational programs and entertainment activities. Decisions will be made concerning whether or not to make ice cream on site and how to attractively merchandise the ice cream for customers.

The farm owner plans to expand the "business and family functions" program by setting up four permanent sites for private events such as company picnics and weddings. He also plans to build a permanent restroom facility connected to the town sewer to replace the current portable toilets. He is considering installing a golf ball driving range.

To ensure the farm's long-term viability, the farm owner is considering the development of 40 to 80 low-income elder housing units on 35 acres of the farm. He got the idea for such a project from a nearby farm owner who had been advised to implement partial development of the farm in order to preserve the remaining portion. The farm owner believes that the town government will endorse the proposal for low-income housing because of the less than 6 percent of low-income housing that is currently available, increasing numbers of elders

who wish to remain in the community but can no longer afford to do so, greater opportunities for government grants, and the fewer, less expensive needs of the retired in contrast to those of their younger counterparts with families. Installing a housing unit on the 35 acres of land is more profitable than building conventional homes on lots that are required to be at least two acres in size by the town's residential zoning laws. Portions of the profit gained from the housing unit venture would be divided among the heirs of the farm owner's mother. Remaining profits would be used to establish a farm trust that would ensure long term viability of the farm, overseeing its operations into perpetuity.

To conclude, the farm owner has conceived many creative ways to make his business grow. He participates in professional organizations, consults with other farmers, and takes advantage of government programs such as APR and disaster relief. He has conferred with FVEP consultants and collaborated with his team of employees. In the future, the farm owner will require additional assistance from consultants such as those provided by FVEP in order to complete profitability analyses of the farm and its departmental areas.

Summary

The farm possesses many distinctive advantages, making it a popular attraction for area residents and tourists. The natural landscape of the farm, in contrast to the bordering housing subdivisions, has aesthetic and emotional

appeal for customers. Visiting the farm piques the imagination of visitors and provides a welcome haven for them from the stresses of modern life. The farm's central location within somewhat affluent suburbs allows easy access to an ever-growing number of enthusiastic customers. The positive reputation of the farm and its offerings is well established. Local advertising has been successful. A dozen brochures explain the various programs and activities. A website that gives general information about the farm and detailed information on special activities has been set up. Unlike some farms that must deal with public political resistance, the farm enjoys wide community acceptance, except for receiving occasional complaints about farm related externalities such as noise and chemical spraying of the orchards. All in all, the farm is seen as a public asset.

Customers have responded quite favorably to the broad marketing strategy adopted by the farm owner to include agricultural education and entertainment. He clearly has the ability to identify consumer demands and has the creative vision to conceive of new programs to address what customers want when they visit the farm. He understands how to market his "product," a New England farm experience that is enjoyable and fun for a wide variety of customers, young and old alike. The farm has a satisfied and loyal following of customers.

In addition to having a successful marketing strategy, the farm owner has strong people management skills that are advantageous to the creation of an

effective and pleasant working environment in which conflict is minimized. His high visibility in the farm stand and on the farm on a daily basis helps keep employee morale high. The satisfied employees inspire customer confidence. The farm business has greatly benefited from the fact that employee commitment has remained consistently high.

In short, the farm business possesses a great number of advantages. Some are due to the farm's history and favorable location. Others were gained through the owner's and key staff members' vision and collaborative efforts to implement changes and through the hard work of all the employees to make the farm a success. The farm's gross income now stands at approximately one million dollars in sales. The future promises even greater prosperity in light of the proposed changes that will be made over the next few years.

This farm is an impressive model of a successful New England farm business that focuses on pick-your-own orchards, a retail farm stand, and the promotion of agri-tourism. By doing so, the farm has enjoyed remarkable growth. Overall sales increased rapidly in recent years to the present level of one million dollars as the farm expanded its bakery and its educational and special event activities. The farm is no longer operating at a loss and net income available for the farm owner's salary reached $62,000 in 1999, the highest level ever. The farm now has a unique opportunity to grow even further. If changes in operations were to be implemented, the projection of the FVEP consultants was that overall

revenue should increase by at least ten percent annually, with expenses rising by no more than five percent per year.

Recommendations for Farmers

Farmers that want to improve the viability of their farms should carefully examine the particulars of their own situations. It is important that they consider the characteristics of their farmland and natural resources, the locations of their farms, and the consumer population of the area. They ought to also assess their own individual strengths and interests regarding new business ventures.

Farmers should also examine their options for change while recognizing the financial risks involved. For example, farmers who want to create an educational and entertainment component for their farm business need to recognize that any one of the various aspects of such an endeavor can succeed or fail, resulting in financial gains or losses. Unknowns include whether or not the advertising program will be successful, the program activities and events will be popular, and customers will be willing to pay high enough prices for their farm experiences. Consider another example posing financial risk, the direct to the consumer sales of a farm stand. Operating a farm stand involves considerable financial investment. Increased revenues may not be sufficient to cover added expenses. Of course, taking calculated risks necessary for business expansion

can lead to sound financial growth as was true for the farm owner in this case study.

Farmers with large land holdings who are concerned about maintaining long-range solvency for their farms might consider selling a small portion of their land to residential or commercial development. They might choose to sacrifice some land if the funds can be applied to make the farm financially secure over the long term.

Farm owners with heirs can set up farm trusts to settle inheritances ahead of time to make sure their farm operations continue indefinitely.

To raise revenues, farmers might consider selling the development rights of their land in the permanent land restriction program of APR or in the temporary land restriction program offered by FVEP. The farm owner in the case study sold the majority of his land development rights to the state but retained development rights for the remainder. Information on these funding programs is available through the Commonwealth of Massachusetts Department of Food and Agriculture, and may be found at http:// www.massdfa.org/funding/index.htm.

Farmers should seek assistance when they need it. They should work with consultants such as those of the FVEP to help them enhance farm profitability. Farmers should seek resources made available by professional associations, resource libraries, and organizations such as the University of

Massachusetts Cooperative Extension Service and the New England Small Farm Institute. The following are examples of useful sources of information about evaluating agri-tourism enterprise alternatives:

- Buchanan, Robert D. and Robert D. Espeseth, 1991. Developing a bed-and-breakfast business plan. North Central Regional Extension Publication 273. Univ. of Illinois, Champaign-Urbana, IL.

- Hamilton, Neil D. 1999. The legal guide for direct farm marketing. Drake University Agricultural Law Center, DesMoines, IA.

- Schuck, Nancy Grudens, Wayne Knoblauch, Judy Green, and Mary Saylor, 1988. _Farming alternatives, a guide to evaluating the feasibility of new farm-based enterprises. NRAEA-32, Northeast Regional Agricultural Engineering Service, Cornell University, Ithaca, NY.

Conclusion

The case study farm has gone through many transformations in its history: from settlement by prehistoric Native Americans to colonization by early English settlers, the establishment of a homestead one hundred and fifty years ago, the addition of a dairy later on, followed by an orchard and a truck farm, to the fruit and vegetable, retail, and entertainment/education farm of today. The farm's success lies in its history, its land, its location, its dedicated employees, and its ability to meet the needs of its suburban clientele. These customers not only want to buy farm fresh food but also seek respite from today's fast-paced, technological culture by spending some leisure time on the farm, on their own as adult visitors or as children at organized birthday or educational activities. Fortunately, most of the farm will be preserved from development by the APR

Program for future generations to come. The farm will continue to be a natural environmental and agricultural reserve within a large, densely populated area that will surely be subjected to ever-increasing development pressures. Past residents and owners of the farm were committed to the farm, the present owner has devoted his life to making the farm solvent, and hopefully his descendents will continue to operate the farm successfully into the twenty-first century.

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